Factors associated with exclusive breastfeeding amongst a cohort of mothers with infants aged 0-8 weeks in Tlokwe, North West Province

BB Olifant

23687665

orcid.org/0000-0003-1780-3689

Dissertation submitted in partial fulfilment of the requirements for the degree Masters of Science in Nutrition at the North-West University

Supervisor: Prof Mieke Faber

Co-supervisor: Mrs Chantell Witten

Graduation: October 2020

Student number: 2368766

SOLEMN DECLARATION

I, Bakang Olifant, hereby declare that with the exception of acknowledged references, that this mini-thesis is my own work and has been text-edited in accordance to the university's requirements.

Signature of student:

Signature of supervisor:

Signature of co-supervisor:

ACKNOWLEDGEMENTS

"Trust in the Lord with all your heart and lean not on your own understanding; in all your ways submit to him, and he will make your paths straight." Proverbs 3: 5-6.

I would like to thank the following people who have contributed in making my mini-thesis a success:

- My supervisor Prof Mieke Faber, thank you for your valuable input, constructive feedback and your patience. I am fortunate to have been your student.
- My co-supervisor Mrs Chantell Witten, thank you for making data collection enjoyable, for your valuable input in my work and most importantly being my mentor.
- Mrs Noloyiso Matiwane, thank you for your assistance during data collection and a newly established friendship.
- The Lerato La Mme team, thank you for working as a well-oiled machine. Nkululeko Semenekane, thank you for assistance during data collection.
- My friends and colleagues, thank you for the constant encouragement and words of advice.
- My family, there are not enough words to express my gratitude towards you during this process. I am because you are, thank you.
- Lastly, I dedicate this mini-thesis to my cousin Velile Makhinana who lost his life when I started with my M.Sc. He was quite the academic, but he did not get the chance to do so. Buti, may you continue resting in peace.

ABSTRACT

The rate of Exclusive Breastfeeding (EBF) is low in South Africa. Furthermore, the EBF rate decreases as infants get older. This study aimed to determine the prevalence of EBF and breastfeeding practices of mothers with infants 0-8 weeks at two time points. This prospective cohort study included 161 mother-infant pairs recruited from eight healthcare facilities in the Tlokwe sub-district of the North West Province of South Africa. A socio-demographic and unquantified food frequency questionnaire was administered at infant age 3-15 days, and at infant age 4-8 weeks. Logistic regression was used to estimate association of EBF with socio-demographic factors.

The prevalence of EBF at infant age 3-15 days was 70.8% and at 4-8 weeks, it dropped to 50.3%. At infant age 3-15 days, 11.8% of mothers practised mixed feeding (breastfeeding and formula feeds) which increased to 21.7% at 4-8 weeks. The percentage of mothers giving water, and non-prescriptive medicines also increased between the two time points. At infant age 3-15 days, mothers in the age categories of 25-29 years ((Adjusted Odds ratio) AOR: 0.14; 95% CI: 0.04- 0.43; p=0.001) and 30-35 years (AOR: 0.26; 95% CI: 0.07- 0.94; p=0.039) were significantly less likely to practise EBF compared to mothers in the age category 19-24 years. Furthermore, mothers with ≥Grade 12 educational level were more likely to practice EBF compared to mothers with less than Grade 12 educational level (AOR: 3.82; 95% CI: 1.62- 9.00; p=0.002). None of the explanatory variables was significantly associated with EBF at infant age 4-8 weeks.

In conclusion, EBF rate significantly decreased over a relatively short period, and the mother's age and educational level were associated with EBF at infant age 3-15 days.

Keywords (5): Exclusive breastfeeding, breastfeeding practices, new born, peri-urban, South Africa.

TABLE OF CONTENTS

LIST OF TABLES

Chapter 1:

Chapter 2:

Chapter 3:

Chapter 4:

LIST OF FIGURES

Chapter 2:

Chapter 3

Chapter 4

LIST OF ABBREVIATIONS

BRICS	Brazil, Russia, India, China, South Africa
BFHI	Baby Friendly Hospital Initiative
CHWs	Community Health Workers
DST-NRF	Department of Science and Technology-National Research Fund
EBF	Exclusive breastfeeding
HIV	Human Immunodeficiency Virus
IBFAN	International Baby Food Action Network
IQ	Intellectual Quotient
MBFI	Mother-Baby Friendly Initiative
NCDs	Non-Communicable Diseases
NDoH	National Department of Health
NPBSA	Normalize Public Breastfeeding South Africa
RtHB	Road to Health Booklet
SA	South Africa
SADHS	South African Demographic and Health Survey
SAMRC	South African Medical Research Council
Stats SA	Statistics South Africa
UNICEF	United Nations Children's Fund
WHO	World Health Organization

CHAPTER 1 INTRODUCTION

1.1 Background and study rationale

The World Health Organization (WHO) recommends that infants should start breastfeeding within an hour of being born and be exclusively breastfed for the first six months, with timely introduction of complementary foods from six months while continuing breastfeeding for up to two years of age or beyond (WHO, 2003). Breastmilk contains nutritional properties that support brain development, can prevent illness and death, and decreases the risks of non-communicable diseases (NCDs,) such as childhood obesity, diabetes, and cardiovascular diseases, which could occur later in life (Horta *et al.,* 2015b:33; Ogbo *et al.*, 2016:350; Ogbo *et al.*, 2017:8).

Globally, exclusive breastfeeding (EBF) rates in low- and middle-income countries have been reported to have increased from 25% in 1993 to 37% in 2013 (Rollins *et al.*, 2016). In South Africa, the EBF rate for infants 0-5 months has increased by almost five-fold in the same period, from 7% in 1997 to 32% in 2016 (NDoH, Stats SA, SAMRC & ICF, 2017). While this is a significant improvement, with only six years to go to reaching the WHO's global target of 50% by 2025 (WHO, 2014a), South Africa's EBF rate is still off target. While the cumulative EBF rate for infants aged 0-5 months is 32%, the respective age-specific EBF rates decrease with increasing age. For infants 0-1 month of age, the 2016 South African Demographic and Health Survey (SADHS) reported that 44% were EBF, for infants 2-3 months the EBF rate dropped to 28.2% and dropped even further to 23.7% for infants aged 4-5 months (NDoH, Stats SA, SAMRC & ICF, 2017). This also shows that reported EBF rates for infants under six months would be influenced by the age distribution of the infants in the sample. North West Province is one of four provinces that reportedly has a low (12%) EBF rate for infants under six months (Siziba *et al.*, 2015). Furthermore, in 2016, the Dr Kenneth Kaunda district, in which the Tlokwe sub-district falls, had the lowest rate of breastfeeding in the province (Stats SA, 2016).

1.2 Study rationale

Scientific evidence has demonstrated the importance of EBF, and its importance is further emphasised by the inclusion of EBF as one of the Global Nutrition targets 2025. A systematic review on factors associated with EBF in Brazil, an upper middle-income country like South Africa, found socio-demographic factors such as maternal age, mothers employment status and education level to be associated with EBF (Boccolini *et al.*, 2015:4).

The probability of dying in the first month of life is noted to be high and the most vulnerable period of an infant's survival. Approximately 18 deaths per 1000 live births occurred within the first month of life globally in 2018 (UNICEF, 2019). The importance of determining socio-demographic factors associated with EBF, specifically within the first two months of life, is supported by the finding that infants who are partially breastfed are at greater risk of all-cause mortality, infection-related mortality, sepsis, and acute respiratory and gastrointestinal infections in the first month of life compared with those who are exclusively breastfed (Khan *et al.*, 2015: 473). Although the systematic review by Boccolini *et al.* (2015) reported an association between EBF and early infant age, it did not define "early" infant age. In addition, few South African studies have reported on the EBF rates in infants younger than 8 weeks (Rollins *et al.,* 2013; Tuthill *et al.,* 2017; Jones *et al.,* 2018) but there are even fewer studies done in the North West province (Goga *et al.,* 2012; Ahmadu-Ali and Couper, 2013).

This study therefore aimed to determine, through a prospective study design, factors associated with EBF among a cohort of mothers with infants 0-8 weeks in the Tlokwe sub-district in North West Province.

1.3 Aims and objectives

The aim of this study was to determine factors associated with EBF amongst a cohort of mothers with infants aged 0-8 weeks in Tlokwe sub-district, North West Province, South Africa.

The objectives of this study were to:

- Determine infant feeding practices of a cohort of mothers with infants aged 0-8 weeks at two time points, namely 3-15 days and 4-8 weeks.
- Determine the association between socio-demographic factors (maternal age, maternal education level, employment status, living arrangements, number of children, and cultural group) and EBF among a cohort of mothers with infants aged 0-8 weeks at two time points namely, 3-15 days and 4-8 weeks.

1.4 Research team

The research team and their responsibilities are presented in Table 1-1.

Table 1-1: **Research team**

Team member	Qualification	Professional registration	Role and responsibility
Prof. Mieke Faber	PhD	Dietitian	Master thesis supervisor and dietary data expert provided technical input for the development of the protocol, research tools and data analysis. Provided student support through the data analyses and writing up of the Masters' thesis
Mrs. Chantell, Witten	MSc (Nutrition management)	Dietitian	Co-supervisor provided academic guidance for the development of the protocol and writing up the Masters' thesis and any subsequent publications. Provided technical and student support in executing the study. Access to and safe keeping of study data.
Prof. HS Kruger	PhD Nutrition MSc Pharmacy	Dietitian Pharmacist	Principal Investigator (PI) for the PhD study in which this Masters' thesis is embedded. Provided technical input and oversight for the study design, data collection, data analyses and write up of any subsequent publications. Access to and safe keeping of all study data
Ms. Bakang Olifant	BSc Nutrition	Nutritionist	Student developed the protocol, executed the study and writing up the Masters' thesis and any subsequent publications. Access to and safe keeping of study data.

1.5 Structure of mini-dissertation

This mini-dissertation is partial fulfilment for the Magister Scientiae in Nutrition degree. It comprises of five chapters:

Chapter one gives the study introduction as well as role of each member of the research team.

Chapter two is the literature review on breastfeeding practices in the context of South Africa and factors that are associated with exclusive breastfeeding.

Chapter three gives a detailed description of the methodology followed in this study.

Chapter four is the research article titled “Factors associated with exclusive breastfeeding amongst a cohort of mothers with infants 0-8 weeks in the Tlokwe-sub district, North West Province.” This article is written in the format of Maternal and Child Nutrition Journal and is referenced according to the journal’s referencing style.

Chapter five provides the summary of the main findings and conclusion, as well as recommendations for future research. Each chapter ends with a reference list, which is formatted according to the NWU Harvard style (NWU, 2012), except for Chapter four (the article).

References

Boccolini, C.S., Carvalho, M.L.D. & Oliveira, M.I.C.D. 2015. Factors associated with exclusive breastfeeding in the first six months of life in Brazil: a systematic review. *Revista de saude publica*, 49:91.

Horta, B.L., Loret de Mola, C. & Victora, C.G. 2015b. Long-term consequences of breastfeeding on cholesterol, obesity, systolic blood pressure and type 2 diabetes: a systematic review and meta-analysis. *Acta paediatrica*, 104:30-37.

Khan, J., Vesel, L., Bahl, R. & Martines, J.C. 2015. Timing of breastfeeding initiation and exclusivity of breastfeeding during the first month of life: effects on neonatal mortality and morbidity—a systematic review and meta-analysis. *Maternal and child health journal*, 19(3):468-479.

National Department of Health (NDoH), Statistics SA (Stats SA), South African Medical Research Council (SAMRC), & ICF, 2017. *South Africa Demographic and Health Survey 2016: Key indicators.* Pretoria, South Africa, and Rockville, Maryland, USA: NDoH, Stats SA, SAMRC and ICF.

Ogbo, F.A., Agho, K., Ogeleka, P., Woolfenden, S., Page, A. & Eastwood, J. 2017. Infant feeding practices and diarrhoea in sub-Saharan African countries with high diarrhoea mortality. *PLoS one*, 12(2): e0171792.

Ogbo, F.A., Page, A., Idoko, J., Claudio, F. & Agho, K.E. 2016. Diarrhoea and suboptimal feeding practices in Nigeria: evidence from the national household surveys. *Paediatric and perinatal epidemiology*, 30(4):346-355.

Rollins, N.C., Bhandari, N., Hajeebhoy, N., Horton, S., Lutter, C.K., Martines, J.C., Piwoz, E.G., Richter, L.M., Victora, C.G. & Group, T.L.B.S. 2016. Why invest, and what it will take to improve breastfeeding practices? *The Lancet*, 387(10017):491-504.

Siziba, L., Jerling, J., Hanekom, S. & Wentzel-Viljoen, E. 2015. Low rates of exclusive breastfeeding are still evident in four South African provinces. *South African journal of clinical nutrition*, 28(4):170-179.

Statistics South Africa (Stats SA), 2016. South African Community Survey 2016. Indicators derived from the full population Community Survey. https://wazimap.co.za/profiles/province-NW-north-west/. Date of access: 17 July 2019.

United Nations Children's Fund (UNICEF). 2019. Neonatal mortality. https://data.unicef.org/topic/child-survival/neonatal-mortality/. Date of access: 7 November 2019.

World Health Organization (WHO). 2003. Global strategy for infant and young child feeding.Geneva: World Health Organization.

World Health Organization (WHO). 2014a. Global nutrition targets 2025: Breastfeeding policy brief.

http://www.who.int/nutrition/publications/globaltargets2025_policybrief_breastfeeding/en/. Date of access 13 Jan 2019.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

While the life-saving benefits of breastfeeding have been known for many decades, the first-ever Lancet Series on Breastfeeding reaffirms the dire need to up-scale breastfeeding (Rollins *et al.*, 2016:491).

Breastmilk is the perfect natural first food for infants as it provides all the energy and nutrients needed by the infant for the first months of life. Breastmilk contains protective antibodies that help infants fight childhood diseases such as diarrhoea and pneumonia (Nathavitharana *et al.*, 1994:196). This is particularly important as globally, diarrhoea is a leading killer of children accounting for approximately 525 000 deaths among children under age five each year (WHO, 2017). In a cohort study in eight countries, infants who were exclusively breastfed for at least half of the previous 30 days were found to be less likely to experience diarrhoea in comparison to those who were not breastfed within the same time frame (Richard *et al.*, 2018:907). Another important factor to consider is that non-breastfed infants are more exposed than breastfed infants to pathogens that may cause diarrhoea (Ogbo *et al.*, 2016:350; Ogbo *et al.*, 2017:8). This exposure may be as a result of feeding bottles and utensils that are not thoroughly sterilised.

Breastmilk has been found to support healthy brain development, which ultimately contributes to better school performance and higher educational outcomes later in life (Horta *et al.*, 2015a:16). Victora *et al.* (2015:202) reported similar findings in a Brazilian cohort who were followed from birth, as they found a positive association between breastfeeding and intelligence quotient (IQ), higher education and income at age 30 years. They also reported that compared to participants who were breastfed for less than one month, those who were breastfed for at least 12 months had an approximately 20% higher income based on average income.

Other long-term health benefits of breastfeeding have been affirmed in a systematic review by Horta *et al.* (2015b:33), which showed that breastfed infants were less likely to develop type 2 diabetes and be overweight or obese later in adulthood.

Breastfeeding does not only have beneficial effects for the infant but also for the mother. A systematic review and meta-analysis conducted by Chowdhury *et al.* (2015:99) reported that the risk of developing breast carcinoma was reduced by 26% and the risk of ovarian cancer by 37% among women who breastfed for more than 12 months, compared to women who

did not breastfeed. In a systematic review and dose response meta-analysis by Aune *et al.* (2014:112), it was reported that the longest duration of breastfeeding compared to no breastfeeding was associated with a 32% reduction in the relative risk of type 2 diabetes.

According to the WHO (WHO, 2003), exclusive breastfeeding (EBF) is defined as an infant receiving only breastmilk, no other liquids or solids or even water are given, but allows an infant to receive oral rehydration solution, or drops/syrups of vitamins, minerals or medicines. The WHO recommends that mothers exclusively breastfeed their infants for the first six months of life, followed by the introduction of nutritious complementary foods while continuing to breastfeed up to two years of age or beyond (WHO, 2003). Scientific evidence has shown that EBF for six months is associated with decreased morbidity and mortality from gastrointestinal infections, such as diarrhoea, when compared to other suboptimal breastfeeding practices; namely predominant breastfeeding, partial breastfeeding or non-breastfeeding (Victoria, 2000:453; Kramer & Kakuma, 2004:11; Lamberti *et al.*, 2011:4).

The importance of EBF, particularly within the first month of an infant's life, has been reported by Khan *et al. (*2015) as infants in this age group who are partially breastfed are at greater risk of all-cause mortality, infection-related mortality, sepsis, acute respiratory and gastrointestinal infections compared to those who are exclusively breastfed.

This chapter aims to review literature that has been published on factors that have been found to be associated with EBF in the context of South Africa.

2.2 EBF trends in South Africa

EBF rates decrease with increased age, with higher rates at infant age 1-2 months and the lowest rates at infant age 4-5 months (NDoH, Stats SA, SAMRC & ICF, 2017). Based on the year of publication, Table 2-1 presents, in chronological order, a summary of South African studies published since 2011 from different provinces which have reported on EBF. The EBF rates were determined from certain parts of different provinces, and as illustrated by Table 2-1, different EBF rates for the same infant age group were reported. As much as all the studies listed in Table 2-1, with the exception of Mushaphi *et al.* (2017), defined EBF according to the WHO's (2003) definition, differences in EBF rates could be as a result of differences in geographical areas, infant feeding data collection methods used and sample size.

Table 2-1: EBF rates reported by studies in South Africa published since 2011.

Reference	Province	Infant feeding questionnaire	Sample size	Infant age EBF rate
Tylleskär *et al.* (2011)	KwaZulu-Natal, Western Cape, Eastern Cape	7-day recall	485	3 months 4%
Rollins *et al.* (2013)	KwaZulu-Natal	7-day food diary kept by mothers	203	6-8 weeks HIV- 92.9% HIV+ 81.4% 3-4 months HIV- 72.8% HIV+ 61.8%
Ahmadu-Ali and Couper (2013)	North West	Researcher formulated questionnaire	424	6 weeks HIV- 52.7% HIV+ 60.6%
Siziba *et al.* (2015)	North West, Gauteng, Free State, Eastern Cape	24-hour recall	580	6 months 12%
Mulol and Coutsoudis (2017)	KwaZulu-Natal	24-hour recall	100	6 months 8.3%
SADHS 2016	South Africa	24-hour recall	8 514	0-5 months 32%
Mushaphi *et al.* (2017)	Limpopo	24-hour recall	314	2 months 12.6%
Tuthill *et al.* (2017)	KwaZulu-Natal	24-hour recall	58	6 weeks HIV+ 81.5%
Jones *et al.* (2018)	Mpumalanga	7-day recall	776	6 weeks 74%
Reimers *et al.* (2018)	KwaZulu-Natal	24-hour recall	277	22 weeks 44.68%
Horwood *et al.* (2018)	KwaZulu-Natal	14-week recall	4 172	14 weeks 49.8%
Nieuwoudt *et al.* (2018)	Gauteng	24-hour recall	298	3-6 months HIV- 46.4% HIV+ 68.0%
West *et al.* (2019)	Gauteng	FRESH Start database	1 913	6 months HIV- 58% HIV+ 37 %

2.3 Determinants of EBF

Rollins *et al.* (2016) proposed a conceptual model for the determinants of breastfeeding practices, which includes early breastfeeding initiation, EBF and continued breastfeeding. This conceptual framework (Figure 2-1) illustrates how breastfeeding is affected by structural context, settings and individual mother-infant factors. The conceptual framework further explains how these factors operate at multiple and different levels and how these factors can affect breastfeeding decisions and behaviour at any point in time. In the next sections of the literature review, these factors will be applied to explore exclusive breastfeeding in the context of South Africa.

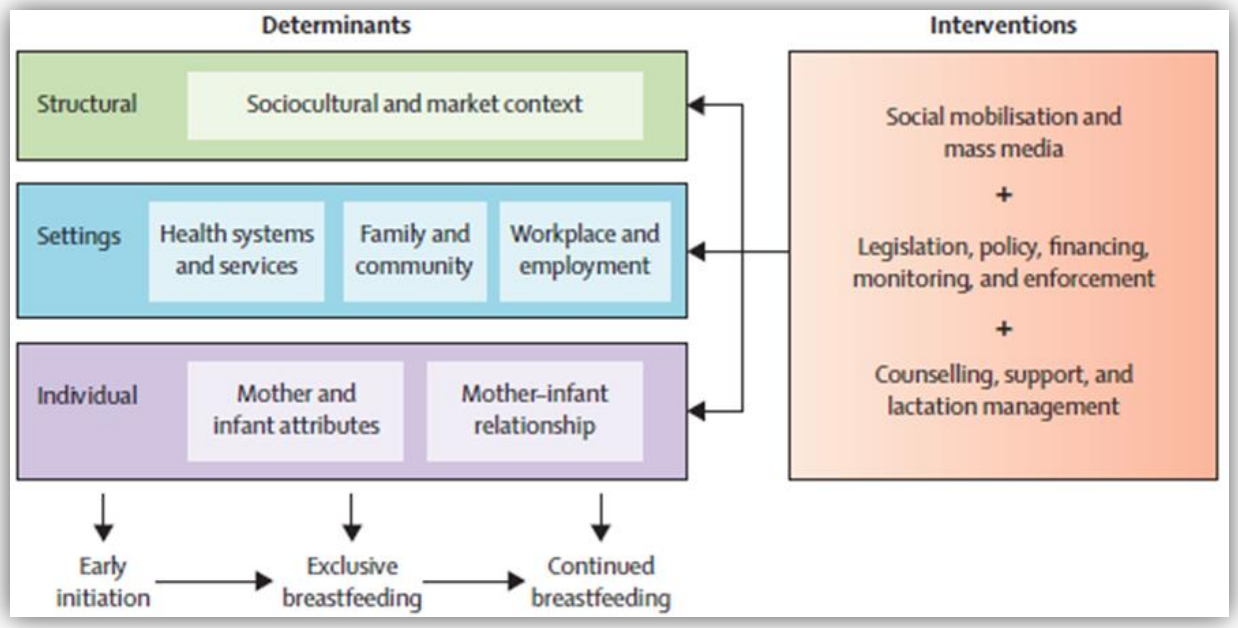


Figure 2-1: Conceptual framework: components of an enabling environment for breastfeeding (Taken from Rollins *et al*., 2016:492).

2.3.1 Socio-cultural and market factors

Although it is not illegal to breastfeed in public in South Africa, there have been instances where mothers' breastfeeding in public have been ridiculed and shamed by the public (Fokazi, 2015). Such negativity from society can deter a mother from continuing or even starting to breastfeed. Such instances have led to social movements such as the Normalise Public Breastfeeding South Africa (NPBSA), which has proposed a draft bill called the Breast-feeding and Related Matters Bill, which was submitted to the office of the previous Health Minister, Dr Aaron Motsoaledi, proposing that it becomes an offence to interfere with, or stop a mother from breastfeeding her child in a public place (Fokazi, 2015). In 2015,

Wimpy, a family restaurant, was in the spotlight for placing “no breastfeeding” signs. This had sparked the debate on whether or not, a mother is allowed to breastfeed in a public space, more so in a family restaurant. In 2017, Spur, also a family restaurant, had a similar incident. Due to movements such as the NPBSA and other breastfeeding advocacy agencies, Spur and Wimpy have declared their restaurants breastfeeding friendly (Wimpy SA, 2017; EWN, 2018).

The International Code for the Marketing of Breast Milk Substitutes was adopted at the 34th World Health Assembly in 1981, as diluted and contaminated breastmilk substitutes were reported to be the reasons for infant malnourishment and death (Muller, 1975). The guidelines of the Code include, amongst others, that all formula labels state the benefits of breastfeeding and the health risks of substitutes, that there should be no promotion of breastmilk substitutes, no free samples of substitutes to be given to pregnant women, mothers or to their families and that there should be no distribution of free or subsidised substitutes to healthcare workers or facilities (WHO, 2014b). South Africa gazetted the Regulations Relating to Foodstuffs for Infants and Young Children (R 991) in 2012 to promote, support and protect breastfeeding. This is particularly important as marketing strategies for infant formula are effective and the formula industry is growing particularly in other BRICS (Brazil, Russia, India, China, South Africa) countries such as Brazil, where the consumption of breastmilk substitutes was estimated to have increased by 6.8% between 2014 and 2019 (Rollins *et al.*, 2016:497). In 2016, the global report on country compliance to the Code found South Africa’s regulations, compared to other countries, to be comprehensive and in near-full compliance with the prescribed requirements of the Code (WHO, UNICEF, IBFAN, 2016).

2.3.2 Health systems and services

In South Africa, over 90% of women receive antenatal care from healthcare workers. With the exception of Gauteng Province (62%), more than 70% of women go for four and/or more antenatal visits (NDoh, Stats SA, SAMRC, ICF, 2017). Over the years, South African studies have shown that mothers receive advice on infant feeding choices regularly by healthcare workers, which places great emphasis on the important role that healthcare workers play in influencing mothers’ infant feeding decisions (Goosen *et al.*, 2014:23-24; Tuthill *et al.*, 2014:221; Chaponda *et al.*, 2017b:2; Jama *et al.*, 2017:6; Mnyani *et al.*, 2017:5; Mushaphi *et al.*, 2017:435; Nieuwoudt & Manderson, 2018:7; Adeniyi *et al.*, 2019:4; West *et al.*, 2019:4).

However, there have been some differences reported by various studies on the infant feeding advice given to mothers. A study conducted in the Western Cape, reported that healthcare workers confirmed that due to their high workload, they did not always have sufficient time to give mothers correct infant feeding information (Goosen *et al.*, 2014:23-24). They also reported that additional educational materials were needed. Healthcare workers, however mentioned there were posters and pamphlets available for the mothers to read and take home, but they did not take into account that although some mothers have some sort of secondary education, some messages were not understood properly, resulting in conflicting infant feeding messages. Similar findings were reported by Zulliger *et al.* (2013:1551), Tuthill *et al.* (2015:22) and Chaponda *et al.* (2017b:3). Despite KwaZulu-Natal having the largest nutrition work force, Horwood *et al.* (2017:4) reported that mothers from two study sites in the province did not receive any feeding advice during their antenatal visits. In the same province, Jama *et al.* (2017:6) further found that health workers frequently gave inappropriate infant feeding advice (such as giving the infant water), which could be the reason why mothers did not exclusively breastfeed. However in Gauteng, Mnyani *et al.* (2017:5) found that some mothers reported they received enough information at healthcare facilities and that they were encouraged to breastfeed. Clearly there are gaps in knowledge and skills of healthcare workers to support a mother to breastfeed. Gaps in knowledge and skills of healthcare workers can be seen in the conflicting feedback from mothers (Tuthill *et al.*, 2014:215, 221; Tuthill *et al.*, 2015:22; Chaponda *et al.*, 2017b:4; Jama *et al.*, 2017:8; Mnyani *et al.*, 2017:6; Nieuwoudt & Manderson, 2018:4-6; West *et al.*, 2019:4). Therefore, it is crucial that healthcare workers are knowledgeable as they are the main source of information for mothers and a key factor for mothers' feeding practices.

The need for all mothers to receive the correct infant feeding information is paramount. With the recent under-five child health campaign called the Side-by-Side campaign, the Road-to-Health card has been replaced with a Road-to-Health booklet (RtHB) to be used as a national assessment and monitoring tool for child health. This tool is to be used by healthcare workers to communicate the applicable and age-appropriate messages to mothers/caregivers. The health promotion section of the RtHB includes age-specific health promotion messages related to infant and young child feeding, communication and play (National Department of Health, 2014). Du Plessis *et al.* (2017:165-166) evaluated the implementation of the RtHB among children aged 0-36 months and their mothers/caregivers between 2012-2014. The key finding from this study was that despite the healthcare workers' knowledge and understanding about the importance of conveying health promotion messages to mothers/caregivers, the implementation of these healthcare messages from the

RtHB was of poor quality. Du Plessis *et al.* (2017:165-166) recommended that a partnership between the National Department of Health, healthcare workers and mothers/caregivers needs to be established in order to support child health.

The origin of primary healthcare (PHC) can be traced to a small health unit in rural KwaZulu-Natal, South Africa, in the early 1940s before it was widely adopted at the Alma Ata conference in 1978 (Kautzky & Tollman, 2008). PHC plays a crucial role in South Africa's bid to achieve equity in health and health service delivery (White *et al*., 2017). Members of the PHC outreach teams are community health workers (CHWs), who are people with no formal or professional training chosen from a community to perform healthcare delivery related functions (Van Ginneken *et al.,* 2010). CHWs have been identified as important key players in support of a mother's decision on infant feeding. This is supported in findings of Horwood *et al.* (2018:7) who reported significant positive changes in infant feeding practices as a result of the visits from CHWs. These findings are similar to those reported in other South African studies by Tylleskär *et al.* (2011:425) and Horwood *et al.* (2017:5, 8). The rate of EBF, particularly at infant age of six weeks, was reported to be higher amongst mothers and infants that were supported by CHWs compared to mothers who were not supported by the CHWs (Horwood *et al.*, 2017:9).

In 1991, the Baby Friendly Hospital Initiative (BFHI) was launched by UNICEF/WHO with the aim to transform healthcare policies by restoring breastfeeding as the natural and normal practice for nurturing babies (WHO, Wellstart International & UNICEF 1991). This initiative was officially implemented in South Africa in 1994, and later renamed to the Mother-Baby Friendly Initiative (MBFI). The MBFI is a strategy to encourage the implementation of the "Ten Steps to Successful Breastfeeding" to ensure that breastfeeding is promoted, protected and supported. In 2011, the Tshwane Declaration for the support of breastfeeding in South Africa resolved that all public hospitals and health facilities would be BFHI-accredited by the year 2015, that all private hospitals and health facilities are partnered to be BFHI accredited by 2015 and that communities are supported to be "Baby Friendly" (National Department of Health, 2011). Van der Merwe (2012) reported higher rates of early initiation of breastfeeding, higher EBF rates and a lower replacement feeding rate for a health district in Mpumalanga that implemented the MBFI compared to a health district in the same province that did not implement the MBFI. In 2012, the South African National Department of Health committed to increasing the accreditation of MBFI public hospitals to 90% in 2016 (National Department of Health, 2016). There has been an increase in the number of accredited MBFI public hospitals, from 0.4% in 1995 to 75% in 2015. The Western Cape and KwaZulu-Natal

have the highest number of MBFI accredited facilities and the Northern Cape the lowest at 17%. The accreditation of private hospitals has also made progress, with six private facilities accredited in 2015/2016 and one more in 2017/2018 (National Department of Health: Child, Youth and School directorate, 2017).

MomConnect is an initiative by the South African National Department of Health which aims to connect pregnant women via cell phones to the health service, to encourage pregnant women to attend antenatal clinics and to encourage healthy behaviour. Mothers receive health messages linked to gestation and the age of their infant, up to one year of age. In addition, women on the system are able to ask for additional information. The questions are sent to a helpdesk that is located at the Department of Health and is operated by a qualified nurse, who is supported by two non-professional health workers (Barron *et al.*, 2016:203). In their evaluation of the MomConnect initiative, Barron *et al.* (2016:209) identified areas which could potentially be improved. These included support to and empowerment of health workers to deal with complaints, providing nurses with information on pregnancy, child health and family planning, and the use of data service for better interaction between the women and the helpdesk. Notably, more than half of the one million pregnant women in South Africa were registered on MomConnect in 2016 (Barron *et al.* 2016:204).

2.3.3 Family and community

Mothers have expressed their need for support from their family and partners in order to adhere to their infant feeding choice (Madiba & Langa, 2014:273-274; Mphego *et al.*, 2014:283). Elderly women have been reported to be regarded as child feeding experts (Chaponda *et al.*, 2017b:3; Mushaphi *et al.*, 2017:436). Grandmothers or any older family members have been found to have an influence on infant feeding practices (Goosen *et al.*, 2014:26; Jama *et al.*, 2017:7; Mnyani *et al.*, 2017:5; Mushaphi *et al.*, 2017:435). Research conducted in the Limpopo Province found that a traditional dish called Tshiunza, which is made from maize and roots from different tree species and fermented to form a soft sour porridge, is given immediately after birth to the infant and promoted by elders. This food is believed to provide infants with energy necessary for optimal growth and to assist them in passing stools since breastmilk is believed to be insufficient for infants (Mushaphi *et al.*, 2008:40; Mushaphi *et al.*, 2017:435). In the Northern Cape, traditional medicines are believed to prepare the baby for teething and to protect against witchcraft (Peer *et al.*, 2016:112). A study that was done in KwaZulu-Natal showed that although most mothers were against the use of traditional medicines, they were told by elders to utilise them. This

re-emphasises the power that elders have on a mother's infant feeding practice (Jama *et al.*, 2017:9). In terms of cultural beliefs, Goosen *et al.* (2014:27) reported that a mother's actions, such as having a sexual relation with a man that is not the infant's father, is believed to have an influence on the quality of her breastmilk, which in turn will affect her choice to breastfeed or not. This could perhaps be fuelled by the fact that people understood that one can transmit the Human Immunodeficiency Virus (HIV) through body fluids, which includes breastmilk. This is supported by a phenomenological study by Risenga and Lebese (2014:57), which reported a mother saying that she believes that if she continues to breastfeed, any condition she has such as abdominal pains, will be passed on to the child.

In the studies by Goosen *et al.* (2014:26) and Mushaphi *et al.* (2017:434), mothers reported that they were advised by family members to give their infants water, gripe water, formula milk and food because their infants were crying, not drinking anything, or not getting enough milk from breastfeeding. Jama *et al.* (2017:8) found similar findings in their study, as mothers reported they were advised to add other food and traditional medicine to their babies' diets. The idea that mothers need to give their infants other liquids such as water before six months comes from the perception that water is believed to help with infant health, stops hiccups, cleans urine, and assists with constipation (Goosen *et al.*, 2014:22). A father or partner also has an influence on a mother's ability to exclusively breastfeed. Fathers have been reported to believe that infants should eat food before six months, as they believe the infant does not get enough nutrients from breastmilk alone (Goosen *et al.*, 2014:23; Jama *et al.*, 2017:9).

2.3.4 Workplace and employment

South African studies have found that returning to work is one of the reasons for breastfeeding cessation (Goosen *et al.*, 2014:27; Siziba *et al.*, 2015:174; Jama *et al.*, 2017:9; Mnyani *et al.*, 2017:7; Horwood *et al.*, 2018:5;Adeniyi *et al.*, 2019:8). The South African labour law allows mothers a minimum of four months' maternity leave but does not compel the employer to remunerate the employees during maternity leave (National Department of Labour, 2004). Although the Code of Good Practice on the Protection of Employees during Pregnancy and After the Birth of a Child has been adopted in South Africa, breastfeeding working mothers are still faced with challenges, such as the practicalities of breastfeeding at work (Zulliger *et al.*, 2013:1553). Breastfeeding mothers may also be demotivated to breastfeed at work because some employers and employees have reported to being uncomfortable with such practice (Rollins *et al.*, 2016:492).

2.3.5 Mother and infant characteristics

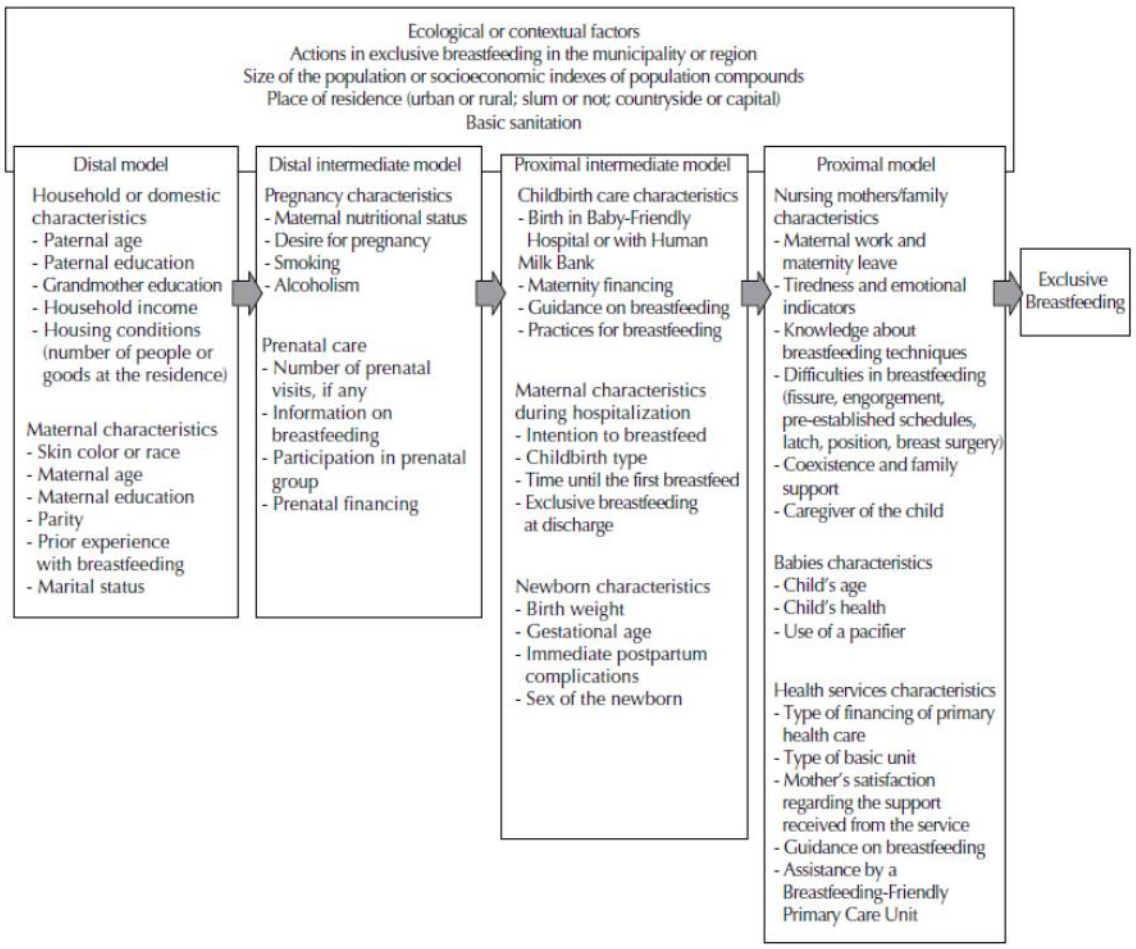


Figure 2-2: **Theoretical model of factors associated with EBF. Taken from Boccolini *et al.,* (2015).**

Figure 2-2 is a theoretical model by Boccolini *et al.* (2015:12) that depicts the proximity of various variables to EBF. As seen in Figure 2-2, the distal model to EBF is comprised of household and domestic characteristics as well as maternal characteristics. Factors that are mostly found in the distal model are maternal socioeconomic factors. This systematic review by Boccolini *et al.* (2015:4) concluded that maternal education, intermediate maternal age, and lack of maternal work were positively associated with EBF. Similar findings have been reported in South African studies (Zulliger *et al.*, 2013:1552; Goosen *et al.*, 2014:27; Siziba *et al.*, 2015:174; Jama *et al.*, 2017:9; Mnyani *et al.*, 2017:7; Horwood *et al.*, 2018:5).

One of the proximal factors to EBF is difficulty to breastfeed, e.g. poor latching/attachment and positioning, which has been documented to predispose mothers to breast health problems, such as mastitis, sore or cracked nipples and breast engorgement (Boccolini *et*

al., 2015:12). In South Africa, there have been cases where the mother reported that her infant did not want to breastfeed at all due to the difficulty to latch. For some mothers, this happened soon after delivery. These mothers believed that this occurred due to them having big or small nipples, resulting in the infant struggling to latch onto the breast. Other breastfeeding difficulties reported in the South African literature are cracked nipples, engorgement, and infection (Doherty *et al*., 2012; Van der Merve, 2012; Jama *et al.*, 2017).

Mothers who reported during the prenatal period not to be confident about their ability to breastfeed were found to be 12 times more likely to stop breastfeeding prematurely compared to those who were confident about breastfeeding (Loke & Chan, 2013:673-674). A mother's perception of insufficient breastmilk supply has been one of the factors that have been reported to be a barrier to EBF (Van der Merwe, 2012:24; Goosen *et al.*, 2014:23; Jama *et al.*, 2017:8; Adeniyi *et al.*, 2019:7). Interestingly, a mother's perception of insufficient breastmilk supply has been reported in less than 5% of women who had a physiological problem that resulted in insufficient breastmilk supply (Renfrew *et al.*, 2000; Scott & Colin, 2002). However, up to 50% of mothers globally have reported breastmilk insufficiency for their baby (Hector *et al.*, 2005:50). This perception could be re-enforced by a crying infant, or the infant wants to breastfeed for longer, or there is no milk being produced when a mother is expressing (Jama *et al.*, 2017:8). Mothers may be educated that insufficient milk results from a mother not breastfeeding frequently enough or long enough, which could be affected by circumstances such as returning to work or being in a working environment that does not facilitate expressing breastmilk (Zullinger et al., 2013:1553). Therefore, as Figure 2-2 illustrates, guidance during breastfeeding is important as it is a proximal factor to the mother's ability to exclusively breastfeed.

It is not only the technical difficulties of breastfeeding that can affect a mother's ability to breastfeed but also her mental health, as stress and anxiety can contribute to depression (Honikman *et al.*, 2012:1; Parsons *et al.*, 2012:68). A study by Rahman *et al.* (2016:458) in Pakistan found that mothers who were depressed were more likely to perceive they had insufficient breastmilk supply and were more likely to stop breastfeeding before six months. This is similar to findings from South Africa by Tuthill *et al.* (2017:1695), which reported that women who were depressed prenatally were less likely to be EBF and stopped breastfeeding exclusively as early as infant age of six weeks.

South African community-based epidemiological studies have shown high prevalence of depressive symptoms amongst pregnant and postnatal women. In a peri-urban settlement in Cape Town, Hartley *et al.* (2011:3) found that 39% of pregnant women screened positive on

the Edinburgh Postnatal Depression Scale (EPDS) for depressed mood. Almost half (49.3%) of the women recruited from a primary healthcare clinic in an urban Black township in Pretoria were reported to have postnatal depression (Mokwena & Shiba, 2014:120). In rural KwaZulu-Natal, where there is a high prevalence of HIV, 47% of women were diagnosed with depression in their third trimester of pregnancy (Rochat *et al.*, 2006). In Mpumalanga, Jones *et al.* (2018:2974) found that depressive symptoms were associated with decreased EBF. These findings highlight the importance of mental health and its effect on breastfeeding. Mothers with mental health disorders, such as depression/anxiety disorders, might interpret their babies' frequent breastmilk demands as a lack of milk, thus try to space out their babies feed and as such, result in low breast milk supply and stoppage of breastfeeding. According to Brown *et al.* (2015) partners and those around them could be supportive, which might reduce depression and mothers would find breastfeeding less challenging.

Infant behaviour, such as perceived infant temperament, has been found to be one of the reasons mothers introduce complementary feeding from four months (Wasser *et al.*, 2011:232). It has also been reported that if the mother perceives her infant to be satisfied and content after breastfeeding, she is more confident and ultimately more likely to continue breastfeeding (Lothian, 1995; Lupton & Whelan, 1998; Mozingo *et al.*, 2000; Grassley & Nelms, 2008). Another infant characteristic that may affect breastfeeding is if the infant has jaundice. This is because a jaundiced infant may experience lethargy, which might result in difficulty latching and suckling (Scrafford *et al.*, 2013:1326).

2.4 South Africa's effort to increase the EBF rate

Over the years, the national EBF rates in South Africa have improved. The South African Government has developed and implemented a number of policies and programmes (Table 2-2), which translate its responsibilities into services to support breastfeeding. Although extensive international and national commitments have been made to promote breastfeeding, these efforts have not led to breastfeeding improvements in all provinces (Martin-Wiesner, 2018:3) and this is further supported by the different EBF rates (Table 2-1), with some provinces performing better than others. The recent breastfeeding policy review, by the DST-NRF Centre of Excellence in Human Development, focused on the review of three fundamental measures as required by the Innocenti Declaration on the protection, promotion and support for breastfeeding. These three fundamental measures include the MBFI, the Department of Health's Regulation of Marketing of Breastmilk Substitutes and the protection for breastfeeding mothers in the workplace (Martin-Wiesner, 2018:11).

Table 2-2: Policies and strategies to support exclusive and continued breastfeeding in South Africa (Department of Health, 2014).

Date	Policies and strategies to support exclusive and continued breastfeeding.	Policy and strategy summary
1994	Baby-Friendly-Hospital Initiative -launched in South Africa Revised document implemented in 2009 (WHO/UNICEF) 2011 SA renames BFHI to Mother Baby Friendly Initiative (MBFI)	The initiative is a global effort to implement practices that protect, promote and support breastfeeding.
1994	SA signatory to The United Nations Convention on the Rights of the Child (CRC)	The United Nations CRC has inspired governments to change laws and policies and make investments so that more children finally get the healthcare and nutrition they need to survive and develop, and there are stronger safeguards in place to protect children from violence and exploitation.
1997	Code of good practices of protecting pregnant and breastfeeding employees	To protect women who work during pregnancy, and the many women who return to work while they are still breastfeeding. It further provides guidelines for employers and employees, concerning the protection of the health of women against potential hazards in their work environment during pregnancy, after the birth of a child and while breastfeeding.
2002	Prevention of mother-to-child transmission guidelines, National Department of Health (NDoH) Revised in 2006 and revised again in 2013	These guidelines provide a range of services to women and infants. These include preventing HIV infections among women of reproductive age (15–49 years), preventing unwanted pregnancies among women living with HIV, and providing women living with HIV with lifelong ART to maintain their health and prevent transmission during pregnancy, labour and breastfeeding.

Table 2-2 *(continued)*: Policies and strategies to support exclusive and continued breastfeeding in South Africa (Department of Health, 2014).

Date	Policies and strategies to support exclusive and continued breastfeeding.	Policy and strategy summary
2007	The Infant and Young Child Feeding Policy Revised 2013	The aim of the strategy is to improve, through optimal feeding the nutritional status, growth and development, health, and therefore the survival of infants and young children.
2011	The Tshwane Declaration of Support for Breastfeeding in South Africa (NDOH)	The country declares itself to promote, support and protects breastfeeding.
2011	Re-engineering Primary Health Care (PHC) for South Africa (NDOH)	Aims to improve the access and quality of the health services via the district health system, decreasing the child and maternal mortality rates by deploying specialist, PHC outreach teams, as well as simultaneously strengthening school health services.
2011	Integrated Management of Childhood Illnesses	This an integrated approach to child health that focuses on the well-being of the whole child. IMCI aims to reduce death, illness and disability, and to promote improved growth and development among children under the age of five years.
2012	South African Strategic Plan for Maternal, New born, Child and Women's Health (MNCWH) and Nutrition in South Africa, 2012-2016 (NDOH)	The plan recommends a reduction in the infant and child mortality rate by adopting practices that include the promotion of EBF, including ensuring that breastfeeding is made as safe as possible for HIV-exposed infants.

The breastfeeding policy review asserts that the increase in MBFI accredited facilities in South Africa has resulted in an increase in breastfeeding initiation taking place in public facilities, appropriate breastfeeding support practices being adopted, the establishment of conducive breastfeeding environments in hospital wards, the use of outdated maternal

practices, such as the use of pre-lacteal feeds, has decreased and that the attitudes to breastfeeding from maternity staff has improved (Martin-Wiesner, 2018:17-19).

In addition to the adoption of the BFHI, the Innocenti Declaration also required the adoption, by governments, of a Code to regulate the marketing of breastmilk substitutes. Although South Africa was declared to be complaint to the Code (WHO, UNICEF, IBFAN, 2016), the breastfeeding policy review reported that South Africa lacks the required monitoring and enforcement structures, mechanisms or systems for implementing the Code. Furthermore, there is no national monitoring, reporting and evaluation system for the Code and as a result, there is no publication of data on marketing baselines or progress. Regarding the continuum of services, there is inadequate promotion for the provision of infant and young child feeding. Lastly, no evidence of a costed plan or allocated resources as required to establish and sustain an effective national coordination of the Code was found (Martin-Wiesner, 2018:44). While there is minimal data available, it has been found that maternity leave policies in United Nations signatory countries, of which South Africa is a part, are effective in increasing EBF by 52%. In multivariate models, national policies were analysed and by guaranteeing paid breastfeeding breaks until the infant was at least six months old was associated with an increase of 8.9% in the rate of EBF of infants younger than six months (Heymann *et al.*, 2013:401). In addition, breastfeeding rooms and breaks to express breastmilk resulted in an increase of breastfeeding rate until the infant was six months old by 25% (Dabritz *et al.*, 2009). South African mothers are entitled to four months' paid maternity leave. However, this benefit only covers mothers that are working in governmental departments and large companies (National Department of Labour, 2004). The Tshwane Declaration specifically resolved that legislation should be reviewed to protect and extend maternity leave for all workers, and to include an enabling workplace (National Department of Health, 2011); currently this resolution has not been addressed. According to Martin-Wiesner (2018:53), policies and laws such as paid maternity leave for a minimum period of three months, protection from job discrimination as well as incentives for employers that create supportive work arrangements, such as day care breastfeeding facilities, should be adopted.

2.5 Conclusion

The benefits of EBF are globally recognised and documented but the practice is poor. A multi-faceted approach has proved to have an influence on a mother's ability to exclusively breastfeed. The South African National Department of Health has adopted infant and young child feeding polices, programmes and guidelines, and this may explain the increase of the national EBF rate from 7% in 2003 to 32% in 2016. In order to reach the 2025 Global

nutrition target for EBF, more effort has to be placed in determining factors associated with EBF so that these factors do not continue to be a barrier to EBF. Although there has been various South African studies that reported on the EBF rates, there are few age-specific EBF studies on infants younger than 8 weeks for the North West Province, with the exception of Goga *et al.* (2012) and Ahmadu-Ali and Couper (2013). Therefore, the aim of this study is to determine the factors that are associated with EBF amongst a cohort of mothers with infants aged 0-8 weeks in the Tlokwe sub-district, North West Province.

References

Adeniyi, O.V., Ajayi, A.I., Issah, M., Owolabi, E.O., Ter Goon, D., Avramovic, G. & Lambert, J. 2019. Beyond health care providers' recommendations: understanding influences on infant feeding choices of women with HIV in the Eastern Cape, South Africa. *International breastfeeding journal*, 14(1):7.

Ahmadu-Ali, U.A. & Couper, I.D. 2013. The practice of exclusive breastfeeding among mothers attending a postnatal clinic in Tswaing subdistrict, North West province. *South African family practice*, 55(4):385-390.

Aune, D., Norat, T., Romundstad, P. & Vatten, L. 2014. Breastfeeding and the maternal risk of type 2 diabetes: A systematic review and dose–response meta-analysis of cohort studies. *Nutrition, metabolism and cardiovascular diseases*, 24(2):107-115.

Barron, P., Pillay, Y., Fernandes, A., Sebidi, J. & Allen, R. 2016. The MomConnect mHealth initiative in South Africa: Early impact on the supply side of MCH services. *Journal of public health policy*, 37(2):201-212.

Boccolini, C.S., Carvalho, M.L.D. & Oliveira, M.I.C.D. 2015. Factors associated with exclusive breastfeeding in the first six months of life in Brazil: a systematic review. *Revista de saude publica*, 49:91.

Brown, A., Rance, J. & Bennett, P. 2016. Understanding the relationship between breastfeeding and postnatal depression: the role of pain and physical difficulties. *Journal of advanced nursing*, 72(2):273-282.

Chaponda, A., Goon, D.T. & Hoque, M.E. 2017. Infant feeding practices among HIV-positive mothers at Tembisa hospital, South Africa. *African journal of primary health care & family medicine*, 9:1-6.

Chowdhury, R., Sinha, B., Sankar, M.J., Taneja, S., Bhandari, N., Rollins, N., Bahl, R. & Martines, J. 2015. Breastfeeding and maternal health outcomes: a systematic review and meta-analysis. *Acta paediatrica*, 104:96-113.

Department of Health. 2014. Protecting, Promoting and Supporting Exclusive and Continued Breastfeeding. A Breastfeeding Course for Health Care Providers Toolkit. Directorate Nutrition National Department of Health, Pretoria.

Dabritz, H.A., Hinton, B.G. & Babb, J. 2009. Evaluation of lactation support in the workplace or school environment on 6-month breastfeeding outcomes in Yolo County, California. *Journal of human lactation*, 25(2):182-193.

Doherty, T., Sanders, D., Jackson, D., Swanevelder, S., Lombard, C., Zembe, W., Chopra, M., Goga, A., Colvin, M. & Fadnes, L.T. 2012. Early cessation of breastfeeding amongst women in South Africa: an area needing urgent attention to improve child health. *BMC pediatrics*, 12(1):105.

Du Plessis, L.M., Koornhof, H.E., Marais, M.L. & Blaauw, R. 2017. Implementation of the Road-to-Health-Booklet health promotion messages at primary health care facilities, Western Cape Province, South Africa. *South African journal of child health*, 11:164-169.

EWN 2018. Staying abreast: Spur 100% behind breastfeeding in restaurant https://ewn.co.za/2018/07/12/staying-abreast-spur-100-behind-breastfeeding-in-restaurant. Date of access: 20 Feb 2019.

Fokazi, S. 2015. Call for law over breast-feeding. https://www.iol.co.za/news/south-africa/western-cape/call-for-law-over-breast-feeding-1883338. Date of access: 20 Feb 2019.

Goga A.E., Jackson D.J., Singh M., Lombard C. 2015. SAPMTCTE report study. Early (4-8 weeks postpartum). Population-level Effectiveness of WHO PMTCT Option A, South Africa, 2012-2013. South African Medical Research Council and National Department of Health South Africa.

Goosen, C., McLachlan, M. & Schübl, C. 2014. Infant feeding practices during the first 6 months of life in a low-income area of the Western Cape Province. *South African journal of child health*, 8(2):50-54.

Grassley, J.S. & Nelms, T.P. 2008. Understanding maternal breastfeeding confidence: A Gadamerian hermeneutic analysis of women's stories. *Health care for women international*, 29(8-9):841-862.

Fokazi, S. 2015. Call for law over breast-feeding. https://www.iol.co.za/news/south-africa/western-cape/call-for-law-over-breast-feeding-1883338. Date of access: 20 Feb 2019.

Hartley, M., Tomlinson, M., Greco, E., Comulada, W.S., Stewart, J., Le Roux, I., Mbewu, N. & Rotheram-Borus, M.J. 2011. Depressed mood in pregnancy: prevalence and correlates in two Cape Town peri-urban settlements. *Reproductive health*, 8(1):9.

Hector, D., King, L., Webb, K. & Heywood, P. 2005. Factors affecting breastfeeding practices. Applying a conceptual framework. *New South Wales public health bulletin*, 16(4):52-55.

Heymann, J., Raub, A. & Earle, A. 2013. Breastfeeding policy: a globally comparative analysis. *Bulletin of the world health organization*, 91:398-406.

Honikman, S., Van Heyningen, T., Field, S., Baron, E. & Tomlinson, M. 2012. Stepped care for maternal mental health: a case study of the perinatal mental health project in South Africa. *PLoS medicine*, 9(5):e1001222.

Horta, B.L., Loret De Mola, C. & Victora, C.G. 2015a. Breastfeeding and intelligence: a systematic review and meta-analysis. *Acta paediatrica*, 104:14-19.

Horta, B.L., Loret de Mola, C. & Victora, C.G. 2015b. Long-term consequences of breastfeeding on cholesterol, obesity, systolic blood pressure and type 2 diabetes: a systematic review and meta-analysis. *Acta paediatrica*, 104:30-37.

Horwood, C., Butler, L., Barker, P., Phakathi, S., Haskins, L., Grant, M., Mntambo, N. & Rollins, N. 2017. A continuous quality improvement intervention to improve the effectiveness of community health workers providing care to mothers and children: a cluster randomised controlled trial in South Africa. *Human resources for health*, 15(1):39.

Horwood, C., Haskins, L., Engebretsen, I., Phakathi, S., Connolly, C., Coutsoudis, A. & Spies, L. 2018. Improved rates of exclusive breastfeeding at 14 weeks of age in KwaZulu-Natal, South Africa: what are the challenges now? *BMC public health*, 18(1):757.

Jama, N.A., Wilford, A., Masango, Z., Haskins, L., Coutsoudis, A., Spies, L. & Horwood, C. 2017. Enablers and barriers to success among mothers planning to exclusively breastfeed for six months: a qualitative prospective cohort study in KwaZulu-Natal, South Africa. *International breastfeeding journal*, 12(1):43.

Jones, D.L., Rodriguez, V.J., Mandell, L.N., Lee, T.K., Weiss, S.M. & Peltzer, K. 2018. Influences on exclusive breastfeeding among rural HIV-infected south African women: a cluster randomized control trial. *AIDS and behavior*, 22(9):2966-2977.

Kautzky, K. & Tollman, S.M. 2008. A perspective on primary health care in South Africa: Primary health care: In context. *South African health review*, p17-30.

Kramer, M.S. & Kakuma, R. 2004. The optimal duration of exclusive breastfeeding. In *Protecting infants through human milk* (pp. 63-77). Springer, Boston, MA.

Khan, J., Vesel, L., Bahl, R. & Martines, J.C. 2015. Timing of breastfeeding initiation and exclusivity of breastfeeding during the first month of life: effects on neonatal mortality and morbidity—a systematic review and meta-analysis. *Maternal and child health journal*, 19(3):468-479.

Lamberti, L.M., Walker, C.L.F., Noiman, A., Victora, C. & Black, R.E. 2011. Breastfeeding and the risk for diarrhea morbidity and mortality. *BMC public health*, 11(3):S15.

Loke, A.Y. & Chan, L.K. 2013. Maternal breastfeeding self-efficacy and the breastfeeding behaviors of newborns in the practice of exclusive breastfeeding. *Journal of obstetric, gynecology & neonatal nursing*, 42(6):672-684.

Lothian, J.A. 1995. Feature: It takes two to breastfeed The baby's role in successful breastfeeding. *Journal of nurse-midwifery*, 40:328-334.

Lupton, P. & Whelan, A. 1998. Promoting successful breast feeding among women with a low income. *Midwifery*, 14(2):94-100.

Madiba, S. & Langa, J. 2014. Cultural practices interfere with adherence to exclusive infant feeding: a qualitative study among HIV positive post natal women in Hammanskraal, South Africa: child nutrition and feeding practices. *African journal for physical health education, recreation and dance*, 20(Supplement 1):264-278.

Mamabolo, R.L., Alberts, M., Mbenyane, G.X., Steyn, N.P., Nthangeni, N.G., Delemarre-van De Waal, H.A. & Levitt, N.S. 2004. Feeding practices and growth of infants from birth to 12

months in the central region of the Limpopo Province of South Africa. *Nutrition*, 20(3):327-333.

Martin-Wiesner, P. 2018. A Policy-Friendly Environment for Breastfeeding: A review of South Africa's progress in systematising its international and national responsibilities to protect, promote and support breastfeeding. Johannesburg: DST-NRF Centre of Excellence in Human Development.

Mnyani, C.N., Tait, C.L., Armstrong, J., Blaauw, D., Chersich, M.F., Buchmann, E.J., Peters, R.P. & McIntyre, J.A. 2017. Infant feeding knowledge, perceptions and practices among women with and without HIV in Johannesburg, South Africa: a survey in healthcare facilities. *International breastfeeding journal*, 12(1):17.

Mokwena, K. & Shiba, D. 2014. Prevalence of postnatal depression symptoms in a primary health care clinic in Pretoria, South Africa. *African journal for physical health education, recreation and dance*, 20(Supplement 1):116-127.

Mozingo, J.N., Davis, M.W., Droppleman, P.G. & Merideth, A. 2000. " It wasn't working": Women's experiences with short-term breastfeeding. *MCN: The American journal of maternal & child nursing*, 25(3):120-126.

Mphego, Z., Madiba, S. & Ntuli, B. 2014. The influence of the family on adherence to exclusive breastfeeding: experiences of women living in extended family households in poorly resourced communities of Mpumalanga Province, South Africa: child nutrition and feeding practices. *African journal for physical health education, recreation and dance*, 20(Supplement 1):279-290.

Muller, M. 1975. The baby killer; a War on Want investigation into the promotion and sale of powdered baby milks in the third world. War on Want, 467 Caledonian Road, London N7 9BE.

Mulol, H. & Coutsoudis, A. 2017. Association of 6 months of exclusive breastfeeding with higher fat-free mass in infants in a low-resource setting with high HIV prevalence in South Africa. *Maternal & child nutrition*, 13(2):e12338.

Mushaphi, L.F., Mahopo, T.C., Nesamvuni, C.N., Baloyi, B., Mashau, E., Richardson, J., Dillingham, R., Guerrant, R., Ambikapathi, R. & Bessong, P. 2017. Recommendations for infant feeding policy and programs in Dzimauli region, South Africa: results from the MAL-ED birth cohort. *Food and nutrition bulletin*, 38(3):428-440.

Mushaphi, L.F., Mbhenyane, X.G., Khoza, L. & Amey, A. 2008. Infant feeding practices of mothers and nutritional status of infants in Vhembe District in the Limpopo Province. *South African journal of clinical nutrition*, 21(2):36-41.

Nathavitharana, K., Catty, D. & McNeish, A. 1994. IgA antibodies in human milk: epidemiological markers of previous infections? *Archives of disease in childhood-fetal and neonatal edition*, 71(3):F192-F197.

National Department of Health, 2011. The Tshwane declaration of support for breastfeeding in South Africa. *South African journal of clinical nutrition*, 24(4):214.

National Department of Health, 2016. Maternal, Newborn, Child and Women's Health (MNCWH) Strategic Plan 2012 – 2016. Pretoria: National Department of Health

National Department of Health (NDoH), Statistics SA (Stats SA), South African Medical Research Council (SAMRC), & ICF, 2017. *South Africa Demographic and Health Survey 2016: Key indicators.* Pretoria, South Africa, and Rockville, Maryland, USA: NDoH, Stats SA, SAMRC and ICF.

National Department of Health: Child, Youth and School Health Directorate. 2017. Annual report 2017/2018. Pretoria: National Department of Health.

National Department of Labour, 2004. No 75 of 1997, Basics Conditions of Employment Act. South Africa. http://www.labour.gov.za. Date of access: 22 March 2019

Nieuwoudt, S. & Manderson, L. 2018. Frontline health workers and exclusive breastfeeding guidelines in an HIV endemic South African community: a qualitative exploration of policy translation. *International breastfeeding journal*, 13(1):20.

Nieuwoudt, S., Manderson, L. & Norris, S.A. 2018. Infant feeding practices in Soweto, South Africa: Implications for healthcare providers. *South African medical journal*, 108:756-762.

Ogbo, F.A., Page, A., Idoko, J., Claudio, F. & Agho, K.E. 2016. Diarrhoea and suboptimal feeding practices in Nigeria: evidence from the national household surveys. Paediatric and perinatal epidemiology, 30(4):346-355.

Ogbo, F.A., Agho, K., Ogeleka, P., Woolfenden, S., Page, A. & Eastwood, J. 2017. Infant feeding practices and diarrhoea in sub-Saharan African countries with high diarrhoea mortality. *PLoS one*, 12(2):e0171792.

Parsons, C.E., Young, K.S., Rochat, T.J., Kringelbach, M. & Stein, A. 2012. Postnatal depression and its effects on child development: a review of evidence from low-and middle-income countries. *British medical bulletin*, 101(1) 57-79.

Peer, N., English, R., Honikman, S. & Du Plessis, L. 2016. Breastfeeding in South Africa: are we making progress? *South African Health Review*, 2016(1):109-123.

Rahman, A., Hafeez, A., Bilal, R., Sikander, S., Malik, A., Minhas, F., Tomenson, B. & Creed, F. 2016. The impact of perinatal depression on exclusive breastfeeding: a cohort study. *Maternal & child nutrition*, 12(3):452-462.

Reimers, P., Israel-Ballard, K., Craig, M., Spies, L., Thior, I., Tanser, F. & Coutsoudis, A. 2018. A cluster randomised trial to determine the efficacy of the "Feeding Buddies" programme in improving exclusive breastfeeding rates among HIV-infected women in rural KwaZulu-Natal, South Africa. *AIDS and behavior*, 22(1):212-223.

Renfrew, M., Woolridge, M.W. & McGill, H.R. 2000. Enabling women to breastfeed: a review of practices which promote or inhibit breastfeeding-with evidence-based guidance for practice. London: Stationery Office

Richard, S.A., McCormick, B.J.J., Seidman, J.C., Rasmussen, Z., Kosek, M.N., Rogawski, E.T., Petri, W., Bose, A., Mduma, E., Maciel, B.L.L., Chandyo, R.K., Bhutta, Z., Turab, A., Bessong, P., Mahfuz, M., Caulfield, L.E. & On Behalf Of The Mal-Ed Network, I. 2018. Relationships among common illness symptoms and the protective effect of breastfeeding in early childhood in MAL-ED: An eight-country cohort study. *The American journal of tropical medicine and hygiene*, 98(3):904-912.

Risenga, P. & Lebese, T. 2014. Lived experiences of first time mothers towards breastfeeding at Muyexe Village in Mopane District, Limpopo Province. *Journal of medicine and medical research,* 2(4): 51-58.

Rochat, T.J., Richter, L.M., Doll, H.A., Buthelezi, N.P., Tomkins, A. & Stein, A. 2006. Depression among pregnant rural South African women undergoing HIV testing. *Jama*, 295(12):1373-1378.

Rollins, N.C., Ndirangu, J., Bland, R.M., Coutsoudis, A., Coovadia, H.M. & Newell, M.-L. 2013. Exclusive breastfeeding, diarrhoeal morbidity and all-cause mortality in infants of HIV-infected and HIV uninfected mothers: an intervention cohort study in KwaZulu Natal, South Africa. *PloS one*, 8(12):e81307

Rollins, N.C., Bhandari, N., Hajeebhoy, N., Horton, S., Lutter, C.K., Martines, J.C., Piwoz, E.G., Richter, L.M., Victora, C.G. & Group, T.L.B.S. 2016. Why invest, and what it will take to improve breastfeeding practices? *The Lancet*, 387(10017):491-504.

Scott, J. & Colin, W. 2002. Breastfeeding: reasons for starting, reasons for stopping and problems along the way. *Breastfeeding review*, 10(2):13.

Scrafford, C.G., Mullany, L.C., Katz, J., Khatry, S.K., LeClerq, S.C., Darmstadt, G.L. & Tielsch, J.M. 2013. Incidence of and risk factors for neonatal jaundice among newborns in southern Nepal. *Tropical medicine & international health*, 18(11):1317-1328..

Siziba, L., Jerling, J., Hanekom, S. & Wentzel-Viljoen, E. 2015. Low rates of exclusive breastfeeding are still evident in four South African provinces. *South African journal of clinical nutrition*, 28(4):170-179.

Statistics South Africa (Stats SA), 2016. South African Community Survey 2016. Indicators derived from the full population Community Survey. https://wazimap.co.za/profiles/province-NW-north-west/.Date of access: 17 July 2019.

Tuthill, E., McGrath, J. & Young, S. 2014. Commonalities and differences in infant feeding attitudes and practices in the context of HIV in sub-Saharan Africa: a metasynthesis. *AIDS care*, 26(2):214-225.

Tuthill, E.L., Chan, J. & Butler, L.M. 2015. Challenges faced by health-care providers offering infant-feeding counseling to HIV-positive women in sub-Saharan Africa: a review of current research. *AIDS care*, 27(1):17-24.

Tuthill, E.L., Pellowski, J.A., Young, S.L. & Butler, L.M. 2017. Perinatal depression among HIV-infected women in KwaZulu-Natal South Africa: prenatal depression predicts lower rates of exclusive breastfeeding. *AIDS and behavior*, 21(6):1691-1698.

Tylleskär, T., Jackson, D., Meda, N., Engebretsen, I.M.S., Chopra, M., Diallo, A.H., Doherty, T., Ekström, E.-C., Fadnes, L.T. & Goga, A. 2011. Exclusive breastfeeding promotion by peer counsellors in sub-Saharan Africa (PROMISE-EBF): a cluster-randomised trial. *The Lancet*, 378(9789):420-427.

United Nations Children's Fund (UNICEF) & World Health Organization (WHO). 1998. HIV and infant feeding: implementation of guidelines: a report of the UNICEF-UNAIDS-WHO Technical Consultation on HIV and Infant Feeding, Geneva, 20-22 April 1998.

Van der Merwe, S.M. 2012. Comparison of infant feeding practices in two health sub-districts with different baby friendly status in Mpumalanga province. Stellenbosch: Stellenbosch University. (Thesis-Masters).

Van Ginneken, N., Lewin, S. & Berridge, V. 2010. 'The emergence of community health worker programmes in the late apartheid era in South Africa: An historical analysis'. *Social science and medicine*, 71(6).

Victora, C.G., Horta, B.L., De Mola, C.L., Quevedo, L., Pinheiro, R.T., Gigante, D.P., Gonçalves, H. & Barros, F.C. 2015. Association between breastfeeding and intelligence, educational attainment, and income at 30 years of age: a prospective birth cohort study from Brazil. *The Lancet global health*, 3(4):e199-e205.

Victoria, C. 2000. Effect of breastfeeding on infant and child mortality due to infectious diseases in less developed countries: a pooled analysis. *Lancet (British edition)*, 355(9202):451-455.

Wasser, H., Bentley, M., Borja, J., Goldman, B.D., Thompson, A., Slining, M. & Adair, L. 2011. Infants perceived as “fussy” are more likely to receive complementary foods before 4 months. *Pediatrics*, 127(2):229-237.

West, N.S., Schwartz, S.R., Yende, N., Schwartz, S.J., Parmley, L., Gadarowski, M.B., Mutunga, L., Bassett, J. & Van Rie, A. 2019. Infant feeding by South African mothers living with HIV: implications for future training of health care workers and the need for consistent counseling. *International breastfeeding journal*, 14(1):11.

White, M.S., Govender, P, & Lister, H.E. 2017. Community health workers lensed through a South African backdrop of two peri-urban communities in KwaZulu-Natal. *African journal of disability* (Online), 6 (1): 1-8.

Wimpy SA, 2017. https://www.facebook.com/notes/wimpy-sa/wimpy-head-office-statement-breast-feeding-incident-parys/1360960300623837/. Date of access: 20 Feb 2019.

World Health Organization (WHO), United Nations Children's Fund (UNICEF), Wellstart International. The Baby-friendly Hospital Initiative: monitoring and reassessment: tools to sustain progress. Geneva: World Health Organization; 1991 (WHO/NHD/99.2. https://apps.who.int/iris/handle/10665/65380. Date of access: 29 April 2019.

World Health Organization (WHO), UNAIDS & UNICEF. 1998. HIV and infant feeding. Vol. 1. Geneva: World Health Organization.

World Health Organization (WHO). 2003. Global strategy for infant and young child feeding:.Geneva: World Health Organization.

World Health Organization (WHO). 2010. Guidelines on HIV and infant feeding 2010: principles and recommendations for infant feeding in the context of HIV and a summary of evidence: Geneva: World Health Organization.

World Health Organization (WHO). 2014a. Global nutrition targets 2025: Breastfeeding policy brief.
http://www.who.int/nutrition/publications/globaltargets2025_policybrief_breastfeeding/en/. Date of access 13 Jan 2019.

World Health Organization (WHO). 2014b. Facts on Breastfeeding. 2014. https://www.who.int/features/factfiles/breastfeeding/en/. Date of access: 24 January

World Health Organization (WHO), United Nations Children's Fund (UNICEF). 2016. Guideline: updates on HIV and infant feeding: the duration of breastfeeding, and support from health services to improve feeding practices among mothers living with HIV. Geneva: World Health Organization.

World Health Organisation, UNICEF, IBFAN. (2016). *Marketing of breast-milk substitutes: national implementation of the International Code Status Report 2016*. Geneva: World Health Organisation.
http://www.who.int/nutrition/publications/infantfeeding/code_report2016/en/ . Date of access; 25 Oct 2019.

World Health Organisation (WHO), 2017. Diarrhoeal disease. https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease. Date of access: 7 November 2019.

Zulliger, R., Abrams, E.J. & Myer, L. 2013. Diversity of influences on infant feeding strategies in women living with HIV in Cape Town, South Africa: a mixed methods study. *Tropical medicine & international health*, 18(12):1547-1554.

CHAPTER 3: METHODOLODY

3.1 Study design

This study is nested within a prospective cohort study which explored mothers' breastfeeding experiences and practices in the Tlokwe sub-district, North West Province, South Africa. The three phases of the prospective cohort study are indicated in Figure 3-1. This study is within phase 1 of the prospective cohort study, which followed mothers with infants 0-8 weeks at timepoint one (infant age 3-15 days) and time point two (infant age 4-8 weeks)

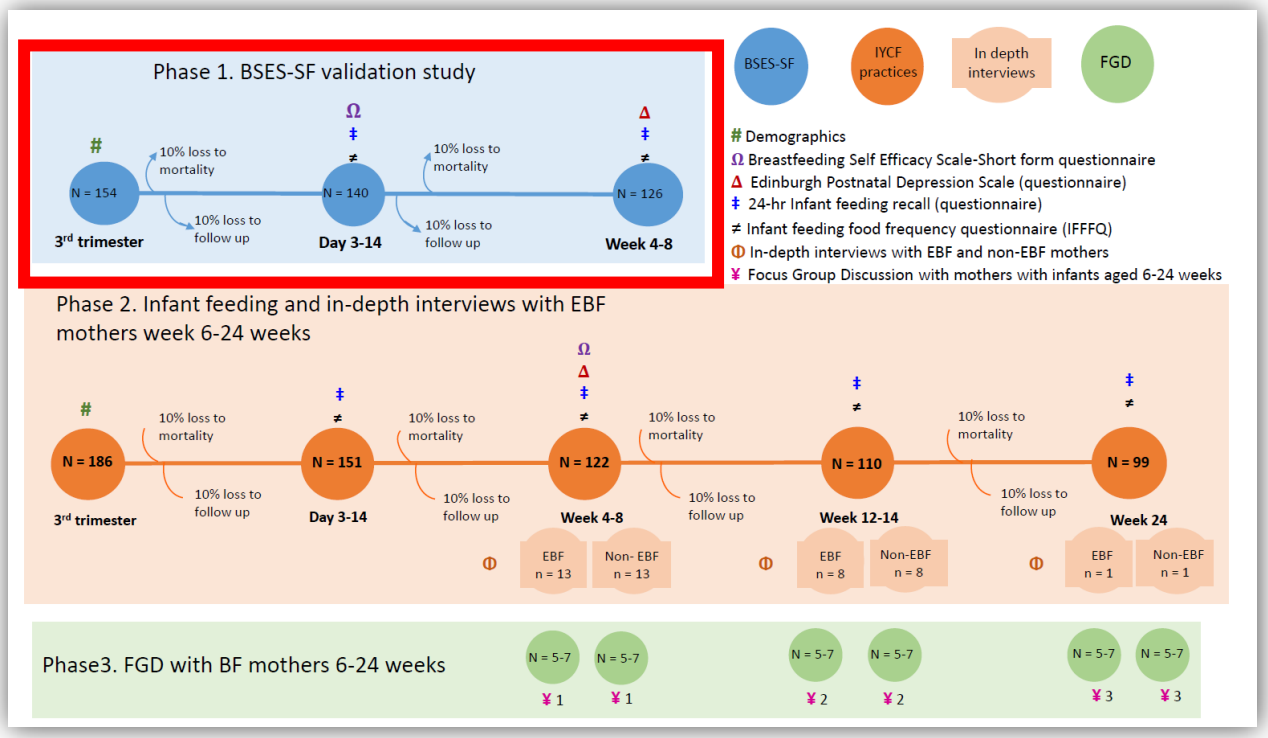


Figure 3-1: Prospective cohort study design.

Note: Infant age at time point 1 was increased to 3-15 days due to the unavailability of mothers with infants aged 14 days on day of data collection. Therefore, data collection took place the following day when the infant was 15 days.

3.2 Study site and infrastructure

Tlokwe sub-district is one of the municipalities within the Dr Kenneth Kaunda District. This sub-district accounts for 23% of the district's population and reflects the demographics of South Africa with 80.3% Black African, 14.5% White and 4.0% Coloureds. The major

languages spoken are Setswana and Afrikaans, with many being bilingual (Tlokwe City Council, 2015). The study sites were in Tlokwe sub-district, which includes Ikageng and its extensions, Potchefstroom town, the locations of Mohadin, Promosa, Matlwang, Leliespan/Baitshoke, Ventersdorp and the surrounding rural areas. Of the four municipalities, Tlokwe health sub-district is the most resourced in health infrastructure with nine municipal clinics and a district hospital located in Potchefstroom town.

Potchefstroom town, Promosa and Mohadin have one clinic each and Ikageng has five clinics. Invitations were posted on the clinics' noticeboard and also handed out by the CHWs inviting pregnant women in their 3rd trimester and mothers with infants aged 3-14 days in the clinics' waiting area to participate in the study (refer to Annexure A). CHWs were trained to identify potential study participants using the inclusion and exclusion criteria listed in Table 3-1.

3.3 Inclusion and exclusion criteria

Table 3-1 outlines the inclusion and exclusion criteria for the study.

Table 3-1: Inclusion criteria for study for study participants

Inclusion criteria	Justification
Postpartum mothers who initiated breastfeeding.	This study explored the practices of breastfeeding mothers and was particularly interested in mothers who were successfully EBF their infants
Mothers who were 19 years or older	While age of consent for legal and research purposes is set at age 18 years, only women aged 19 years and older were included in this study to avoid the inclusion of adolescents who were categorised as individuals aged between 10 and 19 years (WHO, 2014). It is well documented that adolescents are ambivalent towards breastfeeding (Nelson, 2009), have lower breastfeeding self-efficacy and lower breastfeeding rates than the general population of child-bearing aged women (Dykes *et al.*, 2003; Cai *et al.*, 2012). A separate study in adolescents is warranted.
Singleton birth	While not impossible to breastfeed two infants simultaneously, it is much more demanding than breastfeeding one infant; the majority of pregnancies in South Africa are singleton births (Statistics South Africa, 2015). Previous large-scale studies in South Africa also only included singleton births (Nor, 2011; Tylleskar *et al.*, 2011; Tomlinson *et al.*, 2014).

Table 3-1 *(continued)*: Inclusion criteria for study participants.

Inclusion criteria	Justification
Mother without a diagnosed physical or mental health condition	Except for a few rare conditions, almost all mothers can breastfeed, but a few medical conditions may prohibit this, such as in the case of advanced AIDS, certain cancer treatments and if a mother is certified as mentally incapacitated (Department of Health, 2013). These are extreme conditions but for the purposes of this study, situations and conditions that can burden a mother more than usual, such as when she is severely ill, bedridden or physically or emotionally incapacitated to breastfeed her infant and is formula feeding her infant. This mother was excluded from the study as a non-breastfeeding mother.
Apparently healthy infant	Healthy full-term infants without any birth anomalies or congenital defects, which could affect breastfeeding.
Can speak English, Afrikaans or Setswana	Afrikaans, Setswana, and English are the most commonly spoken languages in the Tlokwe sub-district. These are also the languages that the research team was able to function with.

Table 3-2: Exclusion criteria for study participants

Exclusion Criteria	Justification
Mothers who intend not to breastfeed	This study is exploring factors associated with EBF.
Severely sick, bedridden or mother requires support to physically hold her infant.	The National Department of Health Maternal and Child guidelines have set parameters in which a mother will not be expected to breastfeed

3.4 Recruitment plan

The figure below illustrates the recruitment plan that was followed for this study.

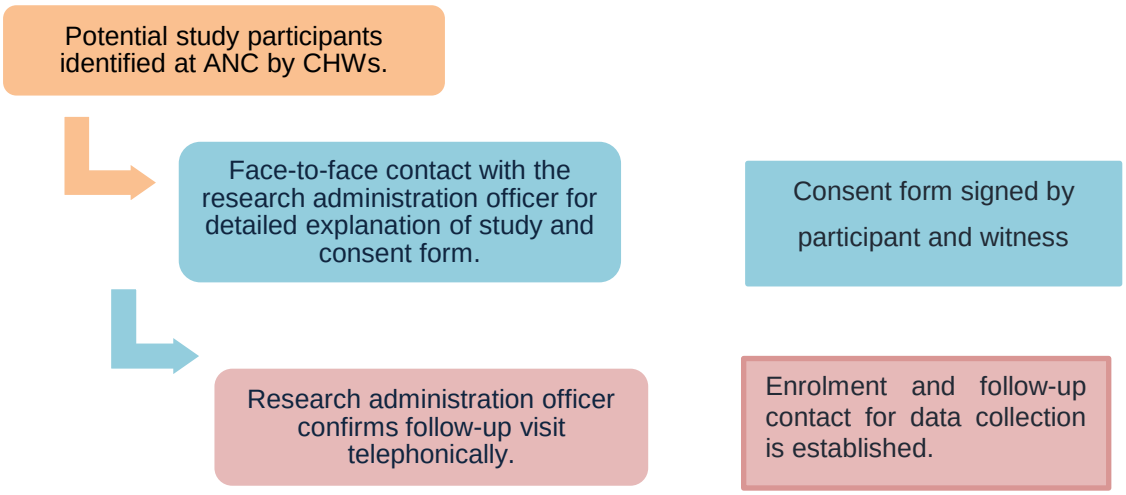


Figure 3-2: Prospective cohort study recruitment plan.

3.5 Sample size calculation

A sample size of 200 participants was calculated for the eight independent variables, to yield a power of more than 90% at a 5% level of significance. Infants aged 15 days were included in this sample size due to difficulty in getting hold of mothers of infants that were 14 days as previously planned on the day of data collection. One hundred and sixty-one mothers had complete data for all the variables and therefore selected for the study.

3.6 Research procedures and data collection

During recruitment, the study administrator, who was fluent in English, Setswana and Afrikaans, held information sessions at the clinics to explain the study to the mothers. The consent process, the content of the consent forms, anticipated risks and benefits was shared and discussed. Mothers were given two days to decide whether or not to participate in the study. On the day of data collection, the consent form (Annexure B), which was available in English, Setswana and Afrikaans, was signed by the participants in the presence of the study administrator. Data collection took place either at the health facility or at the participant's home. Table 3-3 provides an overview of the research procedures and data collection methods followed.

Table 3-3: An overview of the research procedures and data collection methods.

Research procedures	First contact session with mothers with infants 3-15 days	Second contact session with mothers with infants aged 4-8 weeks
Socio-demographic questionnaire (Annexure C)	After enrolment, the socio-demographic questionnaire was administered by the researchers to mothers with infants aged 3-15 days.	A selection of questions from the socio-demographic questionnaire was repeated with the same mothers when their infants were aged 4-8 weeks.
Infant feeding and food frequency questionnaire (Annexure D)	After enrolment, the infant feeding and food frequency questionnaire was administered by the researchers to mothers with infants aged 3-15 days.	The infant feeding and food frequency questionnaire was repeated with the same mothers when their infants were aged 4-8 weeks.

3.7 Data collection

Socio-demographic, health and lifestyle data were collected using a socio-demographic questionnaire. This questionnaire was developed from a compilation of questions previously asked in the demographic and health survey (NDoH, SAMRC & ICF, 2017), the SANHANES (HSRC, 2013) and a previous study conducted in North West Province (Rothman *et al*., 2018).

The infant feeding and food frequency questionnaire was developed based on the food categories recommended by WHO (WHO, 2008) and adapted to a seven-day recall period to give a broader time line for food and fluid intake in infants. The food frequency component for all foods and fluids consumed had three categories for mothers that reported giving any food/ liquid (everyday, 2-6 times/week, once/week) as to reflect how often a food or fluid was given to the infant. This information was collected during both interviews. EBF was defined as no other food or drink, not even water, except breastmilk but allows infants to receive ORS, drops and syrups in the last seven days. Explanatory variables for EBF were chosen based on a review of literature and included the following:

- Mothers' age was recoded into the following 19-24, 25-29, 30-35 and >35 years.
- Number of children was recoded into 1, 2 and 3 and above.

- Cultural groups were grouped into Tswana or other groups, namely Sotho, Xhosa, Coloured, Tsonga, Venda.
- Educational level was recoded into <Grade 12 or ≥Grade 12.
- Household income at 1st and 2nd interview was recoded into <R3000, R3001-R6000 and > R6000; don't know option was considered as missing.
- Living arrangement at 1st and 2nd interview was recoded into living with father of infant or others, namely living with new partner, living with family, living on her own.
- Type of delivery was asked in the questionnaire; either vaginal or caesarean section. Some variables (cultural groups, living arrangements) were recoded based on response frequency.

All data collection tools were translated into the three most spoken languages in the area, namely Setswana, IsiXhosa and Afrikaans. The questionnaires were tested for understanding by piloting the questionnaires to a group of breastfeeding mothers (not the study participants) before data collection.

3.8 Data management, monitoring and quality assurance

Data entry was done each day after data collection by the research team on a standardised Google form; separate Google forms were created to enter data collected at the specified time points (i.e. 3-15 days and 4-8 weeks). To ensure data entry quality, 10% of the data entered was audited by an independent data capturer. Data extraction of 161entries at infant age 3-14 days was done to constitute the database for this study. A further extraction for the same 161entries was conducted at infant aged 4-8 weeks. The captured data was shared within the research team in Microsoft Excel and SPSS format for quality checks. Completed questionnaires were kept in storage boxes in a locked cabinet in the office of the co-supervisor. Electronic data was password protected and kept on disc and on an external hard drive entrusted to the study principle investigator (PI) and supervisors. Only the supervisors and the research team had access to the password protected data. The NWU/CEN will take responsibility to destroy all hard-copies through shredding after the required seven years that data should be kept. To ensure the integrity of the data and to protect the data from misuse in the hands of any unauthorised persons, access to the data will be limited to the NWU-affiliated research team and the statistician.

This study was monitored against the proposed timeline and activity plan by the researchers and supervisors by means of monthly meetings. The ethical aspects were monitored with the supervision of the study PI. Monitoring was also co-shared with the team from the Department of Health under the guidance of the District Primary Health Care Co-ordinator.

3.9 Statistical analyses

Statistical analysis was performed by the student, who was supervised by a statistician, Dr Anselm Berde, and supervisor, Prof Mieke Faber. Mother-infant characteristics were described using frequencies, and percentages. For continuous variables, mean, range and standard deviation were computed. The Chi-Square test was used to determine any association between EBF and socio-demographic factors. In addition, effect sizes were determined through Phi and Cramer's V test. To facilitate interpretation of findings, results of the univariate were presented as crude odds ratio.

Binary logistic regression was used for the multivariate analysis between EBF and related factors. All explanatory variables for EBF were considered for the multivariable model except for marital status, household income and employment status, which were excluded due to inconsistent responses between the two observation time points.

The multivariate model was further adjusted for time of interview measured as a continuous scale since there was a difference in the length of data collection within each observation time point. For the first observation period, the difference was 12 days and for the second it was 4 weeks.

Although the relatively small sample size means that statistical significance should be interpreted with caution, a p-value of less than 0.05 was still considered indicative of a significant association. Statistical analysis was conducted using IBM SPSS version 22 (IBM Company, Armonk, New York, USA).

3.10 Ethical aspects

The ethical considerations are based on and in line with the Declaration of Helsinki (World Medical Association, 2008) and the Department of Health (2015). This research study is based on the ethics principles of justice (inclusion/exclusion), respect, autonomy and beneficence/non-maleficence. This study obtained ethical approval from the North-West University Human Research Ethics Committee-NWU-00030-17-A1-01 (Annexure G) and support from the North West Provincial Department of Health (Annexure E). The research study and the NWU-affiliated researchers are covered under the relevant insurance policies of the university.

3.11 Privacy and confidentiality

Privacy of the participants during data collection was ensured by using one of the private rooms within the clinics or within their homes. Personal details such as mothers' name and contact numbers were stored separately on an Excel spreadsheet, available only to the research team. Anonymity was maintained by coding the data collection sheets and not naming or using any identifiers that could identify participants. A unique participant number was assigned for each participant and this number was used for every stage of the data collection process. All collaborators and the research team completed and signed confidentiality agreements.

3.12 Direct and indirect benefits and safety plan

There were no direct benefits for the mothers in this study, and no direct risk involved in participating. The indirect benefit of this study was that researchers had the opportunity of obtaining first-hand information regarding infant feeding practices of mothers of infants 0-8 weeks.

The possible experience for the mothers was not different from their daily routines as data collection was done either at the clinics or at home. As far as possible and when necessary, data collection was scheduled not to interfere with the health services mothers had to attend, but were held later in the day at the clinic or at her home at a time convenient for the mother.

In case of an event of stress caused during data collection, the research team members had put in place necessary precautions, such as debriefing and referral to available counselling services at the primary healthcare facilities. Research team members could report all negative research experiences on behalf of themselves and/or the participants to the study coordinator, the PI and the NWU Ethics office.

3.13 Incentive and reimbursement

Participants had no out of pocket expenses to participate in this study. Data collection was conducted at a time when the mother was either at the clinic or at her home, resulting in no transportation costs for the mother. At the end of the eight weeks, the mothers were given a gift pack of personal and infant toiletries to the value of R50 as a token of appreciation.

3.14 Dissemination of results

The findings of this study, independent of the whole cohort study, will be printed as well as orally presented to the following bodies on an agreed day after consultation with leadership of the bodies; National Department of Health Breastfeeding Technical Working Group, the Provincial Department of Health, the Tlokwe sub-district Department of Health, and participating health facilities. In addition, the study findings will also be published in a peer-reviewed journal article and presented at a scientific conference. A radio slot will be arranged with the local radio station to share results with the community.

References

Cai, X., Wardlaw, T. & Brown, D.W. 2012. Global trends in exclusive breastfeeding. *International breastfeeding journal*, 7(1):1-5.

Department of Health. Nutrition. 2013. Infant and Young Child Feeding Policy. Pretoria.

Department of Health, 2015. Ethics in research, principles, processes and structures 2nd edition. Republic of South Africa.

Dykes, F., Moran, V.H., Burt, S. & Edwards, J. 2003. Adolescent mothers and breastfeeding: experiences and support needs--an exploratory study. *Journal of human lactation*, 19(4):391-401.

Human Science Research Council (HSRC). 2013. The South African National Health and Nutrition Examination Survey (SANHANES-1). Data analysis on infant feeding practices and anthropometry in children under five years of age: South Africa 2012. Pretoria.

National Department of Health (NDoH), Statistics SA (Stats SA), South African Medical Research Council (SAMRC), & ICF, 2017. *South Africa Demographic and Health Survey 2016: Key indicators.* Pretoria, South Africa, and Rockville, Maryland, USA: NDoH, Stats SA, SAMRC and ICF.

Nelson, A.M. 2009. Adolescent attitudes, beliefs, and concerns regarding breastfeeding. *MCN American journal of maternal/child nursing*, 34(4):249-255.

Nor, B. 2011. Exclusive infant feeding promotion in a high HIV prevalence area: A cross-sectional community-based study in South Africa. *The Lancet*, 378:8.

Rothman, M., Faber, M., Covic, N., Matsungo, T.M., Cockeran, M., Kvalsvig, J.D. & Smuts, C.M. 2018. Infant development at the age of 6 months in relation to feeding practices, iron status, and growth in a peri-urban community of South Africa. *Nutrients*, 10(1):73

Statistics South Africa. 2015. Recorded live births 2014. Pretoria.

Tlokwe City Council (2015). Tlokwe Cty Council Annual Report 2013/2014. Potchefstroom.

Tomlinson, M., Doherty, T., Ijumba, P., Jackson, D., Lawn, J., Persson, L.A., Lombard, C., Sanders, D., Daviaud, E., Nkonki, L., Goga, A., Rohde, S., Sitrin, D., Colvin, M. & Chopra, M. 2014. Goodstart: a cluster randomised effectiveness trial of an integrated, community-based package for maternal and newborn care, with prevention of mother-to-child transmission of HIV in a South African township. *Tropical medicine & international health*, 19(3):256-266.

Tylleskar, T., Jackson, D., Meda, N., Engebretsen, I.M., Chopra, M., Diallo, A.H., Doherty, T., Ekstrom, E.C., Fadnes, L.T., Goga, A., Kankasa, C., Klungsoyr, J.I., Lombard, C., Nankabirwa, V., Nankunda, J.K., Van de Perre, P., Sanders, D., Shanmugam, R., Sommerfelt, H., Wamani, H., Tumwine, J.K. & Group, P.-E.S. 2011. Exclusive breastfeeding

promotion by peer counsellors in sub-Saharan Africa (PROMISE-EBF): a cluster-randomised trial. *The Lancet*, 378(9789):420-427.

World Health Organization (WHO). 2008. Indicators for assessing infant and young child feeding practices: conclusions of a consensus meeting held 6–8 November 2007 in Washington D.C., USA. Geneva: World Health Organization. http://www.who.int/maternal_child_adolescent/documents/9789241596664/en/ Date of access: 13 January 2018.

World Health Organization (WHO). 2014. Adolescent pregnancy. http://www.who.int/mediacentre

World Medical Association, 2008.Declaration of Helsinki. Ethical principles for medical research involving human subjects. Adopted by the 18th WMA General Assembly, Helsinki, Finland, June 1964, and amended by the WMA General Assembly, Seoul, Korea, October 2008.

CHAPTER 4: ARTICLE

4.1 Title page

Factors associated with exclusive breastfeeding amongst a cohort of mothers with infants 0-8 weeks in the Tlokwe sub-district, North West Province.

Bakang Olifant[1] (23687665@nwu.ac.za)*

Chantell Witten[2] (Chantell.Witten@nwu.ac.za)

Mieke Faber [1, 3] (Mieke.Faber@mrc.ac.za)

[1]Centre of Excellence for Nutrition (CEN), North-West University, Potchefstroom, South Africa

[2]School of Physiology, Nutrition and Consumer Science, North-West University, Potchefstroom, South Africa

[3]Non-communicable Diseases Research Unit, South African Medical Research Council, Tygerberg, South Africa

*Corresponding author

Acknowledgements: The research team, Dr A Berde for statistical assistance and the mothers who participated in study.

Source of funding: Centre of Excellence for Food Security, University of the Western Cape

Conflict of interest: None of the authors had no conflict of interest to declare.

4.2 Abstract

The rate of Exclusive Breastfeeding (EBF) is low in South Africa. This study aimed to determine the prevalence of EBF and breastfeeding practices of mothers with infants 0-8 weeks at two time points. This prospective cohort study included 161 mother-infant pairs recruited from eight healthcare facilities in the Tlokwe sub-district of the North West Province of South Africa. A socio-demographic and unquantified food frequency questionnaire was administered at infant age 3-15 days, and at infant age 4-8 weeks. Logistic regression was used to estimate association of EBF with socio-demographic factors.

The prevalence of EBF at infant age 3-15 days was 70.8% and at 4-8 weeks, it dropped to 50.3%. At infant age 3-15 days, 11.8% of mothers practised mixed feeding (breastfeeding and formula feeds) which increased to 21.7% at 4-8 weeks. The percentage of mothers giving water, and non-prescriptive medicines also increased between the two time points. At infant age 3-15 days, mothers in the age categories of 25-29 years ((Adjusted Odds ratio) AOR: 0.14; 95% CI: 0.04- 0.43; p=0.001) and 30-35 years (AOR: 0.26; 95% CI: 0.07- 0.94; p=0.039) were significantly less likely to practise EBF compared to mothers in the age category 19-24 years. Furthermore, mothers with ≥Grade 12 educational level were more likely to practice EBF compared to mothers with less than Grade 12 educational level (AOR: 3.82; 95% CI: 1.62- 9.00; p=0.002). None of the explanatory variables was significantly associated with EBF at infant age 4-8 weeks.

In conclusion, EBF rate significantly decreased over a relatively short period, and the mother's age and educational level were associated with EBF at infant age 3-15 days.

Keywords (5): Exclusive breastfeeding, breastfeeding practices, new born, peri-urban, South Africa.

4.3 INTRODUCTION

According to the World Health Organization (WHO) (2003), exclusive breastfeeding (EBF) is defined as an infant receiving only breastmilk, no other liquids or solids and not even water is given, but allows an infant to receive oral rehydration solution, or drops/syrups of vitamins, minerals or medicines. The WHO recommends that mothers exclusively breastfeed their infants for the first six months of life, followed by the introduction of nutritious complementary foods while continuing to breastfeed two years of age or beyond (WHO, 2003). Scientific evidence has shown that EBF for six months of life is associated with decreased morbidity and mortality from gastrointestinal infections, such as diarrhoea, when compared to other suboptimal breastfeeding practices, namely predominant breastfeeding, partial breastfeeding or non-breastfeeding (Victoria, 2000; Kramer & Kakuma, 2004; Lamberti *et al.*, 2011).

EBF rates from low- and middle-income countries have been reported to have increased from 25% in 1993 to 37% in 2013 (Rollins *et al.,* 2016). The South African EBF rate for infants 0-5 months has also increased by almost five-fold in the same period of time, from 7% in 1997 to 32% in 2016 (NDoH, Stats SA, SAMRC & ICF, 2017). While this is a significant improvement, with only six years to go, South Africa's EBF rate is still far from reaching the WHO global target of 50% by 2025 (WHO, 2014).

In South Africa (SA), the EBF rate for infants aged 0-5 months was 32% and the respective age-specific EBF rates decreased with age. For infants 0-1 month of age, the EBF rate was 44% while for infants between 2-3 months, the EBF rate decreased to 28.2% and it decreased even further to of 23.7% for infants aged 4-5 months (NDoH, Stats SA, SAMRC & ICF, 2017).

Within the first month of life, infants are reported to be vulnerable, with a high global mortality of 18 deaths per 1000 live births (UNICEF, 2019). These deaths are preventable if early initiation of breastfeeding and EBF interventions are carried out early. EBF is also reported to be the easiest, most cost-effective and life-saving intervention for the new born (WHO, 2010). To decrease neonatal and infant mortality rate, as well morbidities, it is important to understand factors associated with EBF, especially during the first month of life. The conceptual framework by Rollins *et al.* (2016) explains how various factors have an influence on breastfeeding practices at three ecological levels, namely individual, settings and structural levels.

In the literature, studies done in SA have shown that at the individual level, mother's attributes such as educational level, age, and type of delivery influence EBF (Zulliger *et al.,* 2013; Goosen *et al.*, 2014; Siziba *et al.,* 2015; Jama *et al*., 2017; Mnyani *et al.,* 2017; Horwood *et al.,* 2018; Nieuwoudt *et al.,* 2018), while at the settings level, formula feeding and family advice play a role

in determining EBF (Ladzani *et al.,* 2011; Mushaphi *et al.,* 2017). At the structural level, sociocultural factors such as infant cleansing rituals and use of non-prescription medicines are barriers for EBF (Nor *et al.,* 2012; Schubl *et al.,* 2014). This study aimed to determine factors associated with EBF among a cohort of mothers with infants aged 0-8 weeks in the Tlokwe sub-district in the North West Province of South Africa.

4.4 METHODS

4.4.1 Study design, population and sample

The study was a prospective cohort study of mother-infant pairs. Recruitment for this study was done in eight primary healthcare clinics in the Tlokwe sub-district, North West Province. This sub-district accounts for 23% of the district population and reflects the demographics of S.A., with 80.3% Black African, 14.5% White and 4.0% Coloureds. The major languages spoken are Setswana, Afrikaans and English, with many people being bilingual (Tlokwe City Council, 2015). A 2016 Community Survey reported that the Dr. Kenneth Kaunda district, of which Tlokwe sub-district falls within, had the lowest rate of breastfeeding in the North West Province (Stats SA, 2016).

For the current study, invitations were posted on the clinics' noticeboard and were also handed out by the community health workers (CHWs) inviting pregnant women in their 3rd trimester and mothers with infants aged 3-14 days in the clinics' waiting area to participate in the study. Mothers could only participate in this prospective cohort study if they were 19 years or older, having a singleton birth with an apparently healthy infant, not diagnosed with a physical or mental health condition and could speak any of the commonly spoken languages in the Tlokwe sub-district (i.e. Afrikaans, Setswana and English). Although the original aim was to include mothers with infants aged 3-14 days at time point one, this was increased to 3-15 days due to the difficulty in getting hold of such mothers on day of data collection. Therefore, data collection took place when the infant was 15 days.

A sample size of 200 mothers was required for 8 independent variables to predict 10% of the variance of the dependent variable at a 5% level of significance, and power of more than 90%. However, the required sample size was not achieved, and 161 of mothers were eventually included in this study.

4.4.2 Data collection

Data was collected using a socio-demographic questionnaire that was developed from a compilation of questions asked in the Demographic and Health Survey (NDoH, Stats SA, SAMRC & ICF, 2017), the SANHANES (HSRC, 2013) and a previous study conducted in the North West Province (Rothman *et al.*, 2018). To ensure clarity, the socio-demographic questionnaire was tested. The unquantified food frequency questionnaire was developed, based on the food categories recommended by the WHO (WHO, 2008), and adapted to a seven-day reference period to give a broader period for food and fluid intake in infants. For foods and fluids consumed, the frequency of consumption was through three pre-defined options (every day, 2-6 times/week, once/week). All data collection tools were translated into the three most spoken languages in the area, namely Setswana, IsiXhosa and Afrikaans, and back translated into English to ensure consistency of meaning. One research team member interviewed each mother at two time points. The first time point was at infant age 3 -15 days, and the second time point was at infant age 4-8 weeks. One hundred and sixty-one mother-infant pairs were interviewed and included in the analysis of the data.

EBF was defined as no other food or drink, not even water, except breastmilk, but allows infants to receive ORS, drops and syrups and medicines. Explanatory variables for EBF were chosen based on a review of literature and included the following: mother's age, educational level, marital status, number of children, cultural group, employment status, household income, living arrangements and type of birth delivery.

4.4.3 Data management

Data entry was done each day after data collection by the research team on a standardised Google form created specifically for each data time point (3-15 days and 4-8 weeks). To ensure data entry quality, 10% of the data entered was audited by an independent data capturer.

4.4.4 Statistical analyses

Mother-infant characteristics are described using frequencies and percentages. The Chi-Square test was used to determine whether there was any significant association between EBF and socio-demographic factors. The results of the univariate analysis were presented as crude odds ratio.

Binary logistic regression was used for the multivariate analysis between EBF and explanatory factors. All explanatory variables for EBF were considered for the multivariable model except for

marital status, household income and employment status, which were excluded due to inconsistent responses between the two observation time points.

The multivariate model was further adjusted for time of interview measured as a continuous scale since there was a difference in the length of data collection within each observation time point. For the first observation period, the difference was 12 days and for the second it was 4 weeks.

Although the relatively small sample size means that statistical significance should be interpreted with caution, a p-value of less than 0.05 was still considered indicative of a significant association. Statistical analysis was conducted using IBM SPSS version 22 (IBM Company, Armonk, New York, USA).

4.4.5 Ethical considerations

Privacy of the participants during data collection was ensured by using one of the private rooms in the clinics. Anonymity was maintained by coding the data collection sheets and not naming or using any identifiers that could identify participants. A unique participant number was assigned for each participant and this number was used for every stage of the data collection process. The study received ethical approval from the North-West University Human Research Ethics Committee (NWU-00030-17-A1-01) and support from the North West Provincial Department of Health. At the end of the eight weeks, the mothers were given a gift pack of personal and infant toiletries to the value of R50 as a token of appreciation.

4.5 RESULTS

4.5.1 Enrolment

The required sample size of 200 for this study was not achieved. The total number of mother-infant pairs interviewed was 161. Table 4-1 shows the number of mother-infant participants enrolled from the different healthcare facilities. The majority of mother-infant participants in this study were recruited from two major maternal obstetric units (MOUs), namely Boiki Tlhapi (23.6%) and Promosa (23.6%). The mean infant age at time point one was 11.0 (SD = 3.8) days, range 3-15 days and at time point two, the mean age was 6.1 weeks (SD = 0.59) and ranged from 4 to 8 weeks.

Table 4-1: Number of mother-infant participants enrolled according to healthcare facilities (n= 161).

Clinic name	n (%)
Boiki Tlhapi[a]	38 (23.6)
Promosa[a]	38 (23.6)
Steve Tswete	27 (16.8)
Lesego	19 (11.8)
Top City	13 (8.1)
Gateway clinic – Potchefstroom	11 (6.8)
Potchefstroom clinic	11 (6.8)
Mohadin	4 (2.5)

[a]Maternal Obstetric Units (MOUs)

4.5.2 Socio-demographic profile of mother-infant pairs.

The socio-demographic profile of mother-infant pairs is presented in Table 4-2. The mean maternal age at the first interview was 28 years (SD = 6.0). Approximately 36.6% of mothers had at least three children, and 60.2% of respondents were Tswana. Just over half of the mothers had an educational level less than Grade 12 (52.8%) and 82.6% were not married. In terms of living arrangements, at the first interview 33.5% of mothers were living with the father of the infant, however, by follow-up only 31.7% of mothers were living with the father of baby.

Table 4-2: Characteristics of mother- infant pairs at baseline (n= 161).

Characteristics	n (%)
Mother's age (years)	
19-24	44 (27.3)
25-29	50 (31.1)
30-35	36 (22.4)
>35	31(19.3)
Marital status first interview	
Married	28 (17.4)
Unmarried	133 (82.6)
Number of children	
1	44 (27.3)
2	58 (36.0)
3 and above	59 (36.6)
Cultural groups	
Tswana	97 (60.2)
Other groups (Sotho, Xhosa, Coloured, Tsonga, Venda)[a]	64(39.8)
Mother's highest education level	
< Grade 12	85 (52.8)
≥Grade 12	76 (47.2)
Mother's living arrangements	
Living with father of baby	54 (33.5)
Others (Living with new partner, living with family, living on your own)[b]	107 (66.5)
Household income	
≤R 3000	67 (41.6)
R 3001-6000	49 (30.4)
>R 6000	23 (14.3)
Don't know	22 (13.7)
Employment status	
Employed	52 (32.3)
Unemployed	109 (67.7)
Type of delivery	
Vaginal delivery	91 (56.5)
Caesarean section	70 (43.5)
Infant age at first interview (days)	11.0 (3.8) [c]
Infant age at second interview (weeks)	6.4 (0.6) [c]

[a] Xhosa=9.9%, Coloured =10.6 %; Sotho=10.6%, Tsonga or Venda= 8.7%

[b] Living with a new partner=0.6%, living on her own=1.9%; living with family=64.0%

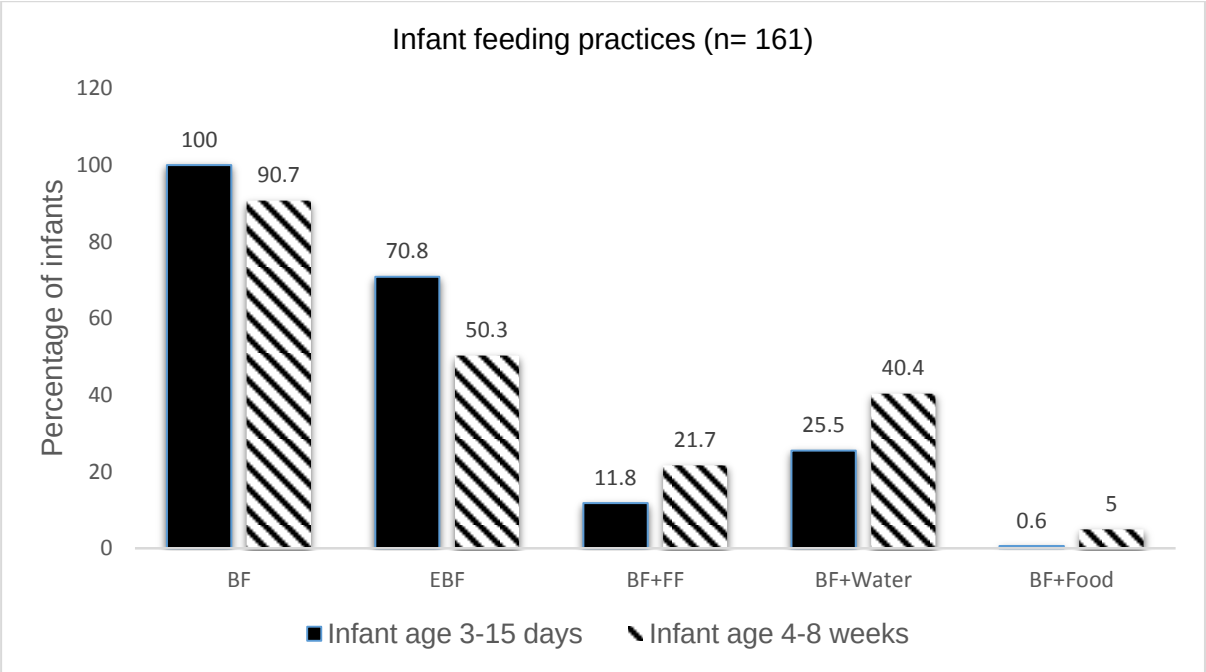
[c]Mean (Standard deviation)

4.5.3 Infant feeding practices

Figure 4-1 describes selected infant feeding practices. The prevalence of EBF at infant age 3-15 days was 70.8%, and at infant age 4-8 weeks the prevalence had dropped to 50.3%.

At time point one, all mothers were breastfeeding; however, only 90.7% were still breastfeeding at the second time point. Approximately 12% of mothers breastfed and gave formula milk during time point one; this figure increased to 21.7% by the second follow-up. A similar trend was observed with breastfeeding and giving water. At the first time point, 25.5% of mothers gave water to their infants in addition to breastfeeding, however, by the second follow-up it had increased to 40.4%.

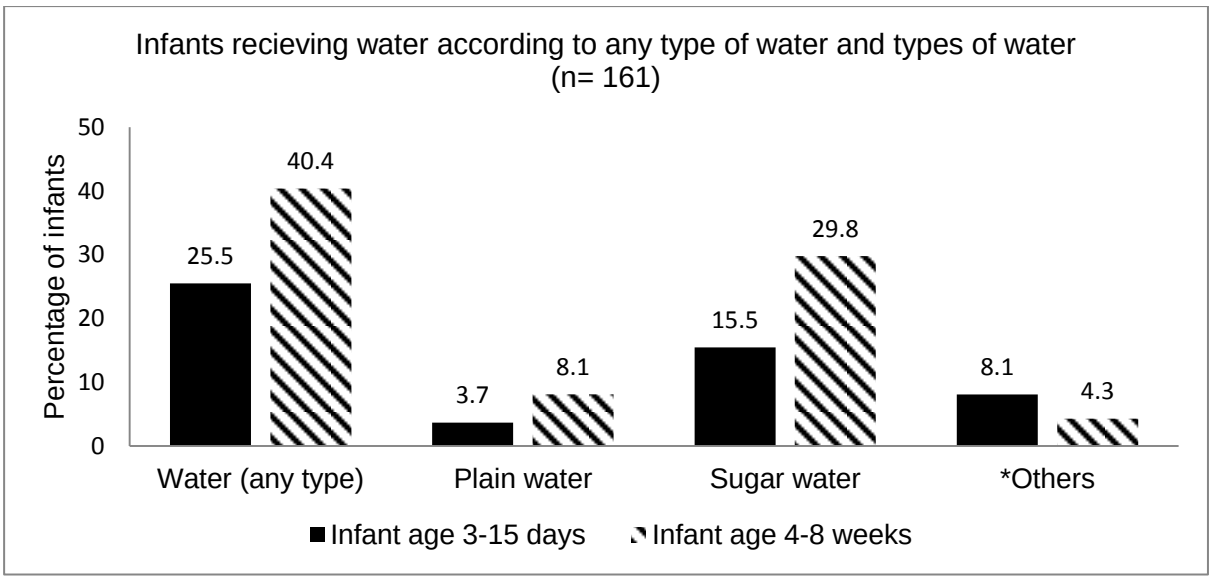
Overall, a few mothers breastfed and gave their infants solids. At the first time point, only 0.6% of mother breastfed and gave semi-solid food, however, by the second follow-up, the percentage had increased to 5%. Commercial infant cereals were the most consumed type of food in this study.



BF-Breastfeeding; EBF-Exclusive breastfeeding: No other food or drink, not even water, except breastmilk but allows infants to receive ORS, drops, syrups and medicines; BF+FF- Breastfeeding and formula feeding; BF+ Water- Breastfeeding and any type of water (e.g. plain water/sugar water/honey water); *BF+ Food- Breastfeeding and any type of food (e.g. commercial infant cereals).

Figure 4-1: Infant Feeding practices of mothers with infants aged 3-15 days and at 4-8 weeks.

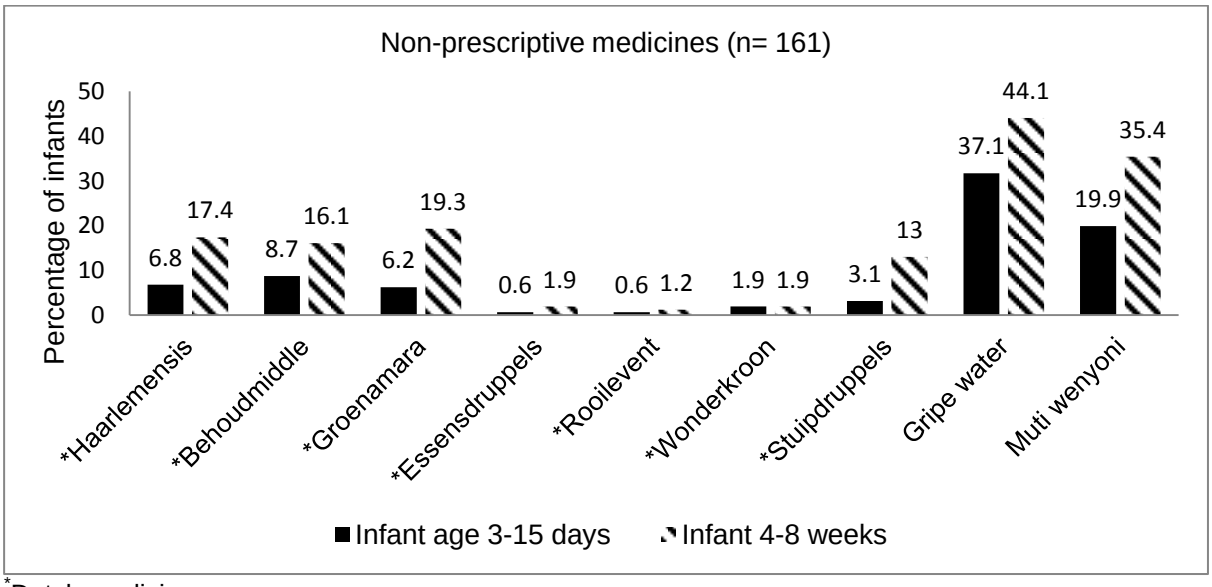
Figure 4-2 shows the percentage of infants receiving water according to type of water and types of water received. At the first time-point, 25.6% of mothers gave their infant any type of water, and this increased to 40.4% during the follow up. Furthermore, the practice of giving plain water and sugar water also increased between the two time points.



*Others (infants aged 3-15 days); plain water and sugar water, plain water and sugar water, plain water and gripe water, sugar and gripe water, sugar and salt in plain water, honey water and gripe water.
*Others (infants aged 4- 8 weeks); plain water and sugar water, plain water and gripe water, salt and sugar water in plain water.

Figure 4-2: **Percentage of infants receiving water at age of 3-15 days and 4-8 weeks.**

Figure 4-3 presents the percentage of infants who were receiving non-prescriptive medicines at the two time points. The percentage of infants receiving these types of medicines almost doubled as the infants got older. Gripe water was the most common non-prescriptive medicine given at both time points.



*Dutch medicines.

Figure 4-3: Non-prescriptive medicines given to EBF and non-EBF infants at age 3-15 days and 4-8 weeks.

4.5.4 Breastfeeding challenges at time point one.

Figure 4-4 presents the types of difficulties the mothers experienced with breastfeeding at the first time point. Of the 161 mother-infant pairs included in the study, 19.9% of mothers reported having breastfeeding difficulties.

Of those mothers who experienced breastfeeding difficulties (n=32), 31.3% reported experiencing difficulty in expressing breastmilk, while 25% said they had poor latching and painful nipples respectively; the least reported breastfeeding difficulty was flat nipples (6.3%).

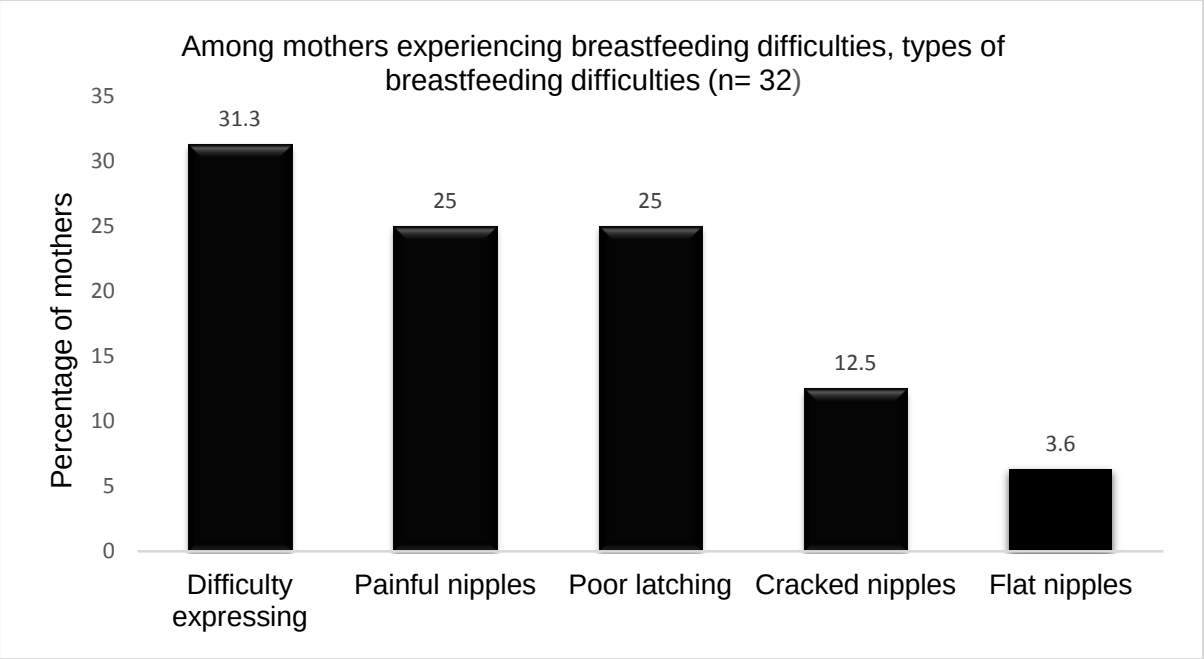


Figure 4-4: **Percentage of mothers who reported breastfeeding difficulties at infant age between 3-15 days.**

Among mothers with caesarean-section delivery (n=70), 28.6% experienced breastfeeding difficulties, while among those with normal vaginal delivery (n=91), 13.2% experienced breastfeeding difficulties.

Of the 32 mothers who experienced breastfeeding difficulties at time-point one, 27 mothers sought assistance. The hospital was the most reported place to seek for assistance (48.1%) when mothers experienced breastfeeding difficulties followed by the family (25.9%) and the least reported was the pharmacy (7.4%).

4.5.5 Factors associated with EBF.

Table 4-3 shows the percentage of infants aged 3-15 days who were EBF according to mother-infant socio-demographic characteristics. Maternal age and educational level were significantly associated with EBF. The table shows that EBF rates were significantly higher among mothers with ≥Grade 12 educational level (78.9%) compared to mothers with lower educational levels (63.5%) (p=0.032). Table 4-4 shows the percentage of infants who were exclusively breastfed according to mother-infant socio-demographic characteristics at second follow-up. None of the explanatory variables were significantly associated with EBF at this time point.

Results of the adjusted logistic regression analysis for EBF with socio-demographic variables at time point one and time point two are shown in Table 4-5. At time point one, mothers aged 25-29 years and 30-35 years were less likely to practice EBF compared to mothers aged 19-24 years. Also, mothers with a higher educational level had more than three times higher odds of EBF compared to mothers with a lower educational level. The Model for time point one demonstrated an appropriate goodness of fit (Hosmer and Lemeshow $\chi2=6.159$, $p=0.629$; Model $\chi2=26.508$, $p=0.003$; Nagelkerke $R^2= 0.217$). No covariate was significantly associated with EBF at time point two in the univariate analysis, as such, no multivariate analysis was conducted for time point two.

Table 4-3: Rates of EBF according to mother-infant socio-demographic characteristics at infants age 3-15 days (n= 161).

Characteristic	*EBF at infant age 3-15 days (n=114)*				*Crude Odds Ratio*	
	n[a]	*%*[b]	χ^2	*p-value*	*OR (95%CI)*	*p value*
Mother's age						
19-24	37	84.1	9.748	0.021	Ref	
25-29	28	56.0			0.24 (0.09-0.64)	0.004
30-35	25	69.4			0.43 (0.15-1.26)	0.124
>35	24	77.4			0.65 (0.20-2.08)	0.467
Marital status first interview						
Unmarried	23	82.1	2.107	0.147	Ref	
Married	91	68.4			2.12 (0.76-5.97)	0.154
Number of children						
1	30	68.2	0.647	0.723	0.73 (0.31-1.73)	0.476
2	40	69.0			0.76 (0.34-1.70)	0.501
3 and above	44	74.6			Ref	
Cultural groups						
SeTswana	65	67.0	1.702	0.192	Ref	
Other groups (Sesotho, IsiXhosa Coloured, Tsonga, Venda)	49	76.6			1.61 (0.79-3.29)	0.194
Mother's Highest educational level						
< Grade 12	54	63.5	4.614	0.032	Ref	
≥ Grade 12	60	78.9			2.15 (1.06-4.36)	0.033
Living arrangement at 1st interview						
Living with father of baby	41	75.9	1.030	0.310	Ref	
Others (Living with new partner, living with family, living on your own)	73	68.2			0.68 (0.32-1.43)	0.312
Household income first interview						
≤R3000	48	71.6	0.127	0.988	Ref	
3001-6000	34	69.4			1.06 (0.36-3.10)	0.922
>6000	16	69.6			0.91 (0.32-2.55)	0.850
Don't know	16	72.7			0.90 (0.40-2.01)	0.792
Employment status first interview						
Employed	36	69.2	0.092	0.761	Ref	
Unemployed	78	71.6			1.12 (0.54-2.30)	0.761
Type of delivery						
Normal Vaginal delivery	66	72.5	0.300	0.584	Ref	
Caesarean section	48	68.6			0.83 (0.42-1.64)	0.584

[a]Row cases
[b]Row percentages
OR: Odds Ratio
Ref: Reference category

Table 4-4: Rates of EBF according to mother-infant socio-demographic characteristics at infants age 4-8 weeks (n= 161).

Characteristic	*EBF at infant age 4-8 weeks (n=81)*				*Crude Odds Ratio*	
	n[a]	*%*[b]	χ^2	*p value*	*OR (95%CI)*	*p value*
Mother's age (years)						
19-24	21	47.7	2.497	0.476	Ref	
25-29	22	44.0			0.86 (0.38-1.94)	0.717
30-35	19	52.8			1.22 (0.51-2.96)	0.653
>35	19	61.3			1.73 (0.68-4.41)	0.248
Marital status second interview						
Unmarried	67	49.6	0.155	0.694	Ref	
Married	14	53.8			1.18 (0.51-2.75)	0.694
Number of children						
1	20	45.5	0.995	0.608	0.86 (0.39-1.89)	0.710
2	32	55.2			1.27 (0.62-2.63)	0.515
3 and above	29	49.2			Ref	
Cultural groups						
Tswana	52	53.6	1.061	0.303	Ref	
Other groups (Sotho, Xhosa, Coloured, Tsonga,Venda)	29	45.3			0.72 (0.38-1.35)	0.304
Highest educational level						
< Grade 12	42	49.4	0.058	0.809	Ref	
≥ Grade 12	39	51.3			1.08 (0.58-2.00)	0.809
Living arrangement at second interview						
Living with father of baby	26	51.0	0.013	0.908	Ref	
Others (Living with new partner, living with family, living on her own)	55	50.0			0.96 (0.50-1.87)	0.908
Household income second interview (EBF, n=59)[c]						
≤R3000	15	71.4	6.108	0.106	Ref	
3001-6000	17	40.5			0.27 (0.09-0.84)	0.024
>6000	15	60.0			0.60 (0.17-2.07)	0.419
Don't know	12	57.1			0.53 (0.15-1.92)	0.336
Employment status second interview						
Employed	21	51.2	0.018	0.893	Ref	
Unemployed	60	50.0			0.95 (0.47-1.94)	0.893
Type of delivery						
Normal vaginal delivery	50	54.9	1.798	0.180	Ref	
Caesarean section	31	44.3			1.81 (0.65-1.22)	0.181

[a]Row cases
[b]Row percentages
[c]Only 109 respondents answered the question, data is thus missing for 52
OR: Odds Ratio
Ref: Reference category

Table 4-5: Predictors of EBF at infant age 3-15 days (n= 161).

Characteristics	*AOR (95%CI)*	*p value*
Mother's age		
19-24	Ref	
25-29	0.14 (0.04-0.43)	0.001
30-35	0.26 (0.07-0.94)	0.039
>35	0.36 (0.08-1.63)	0.187
Number of children		
1	0.36 (0.10-1.30)	0.120
2	0.83 (0.31-2.23)	0.707
3 and above	Ref	
Cultural groups		
SeTswana	Ref	
Other groups (Sesotho, IsiXhosa, Coloured, Tsonga, Venda)	1.95 (0.87-4.41)	0.107
Highest education level		
<Grade 12	Ref	
≥Grade 12	3.82 (1.62-9.00)	0.002
Living arrangements at 1st interview		
Living with father of baby	Ref	
Others (Living with new partner, living with family, living on her own)	0.70(0.29-1.67)	0.417
Type of delivery		
Vaginal delivery	Ref	
Caesarean section	0.64 (0.30-1.41)	0.268
Infant age at first interview (days)	0.94 (0.85-1.05)	
Hosmer and Lemeshow χ^2	6.159, p=0.629	
Model χ^2	26.508, p=0.003	
Nagelkerke R^2	0.217	

AOR=Adjusted odds Ratio

Ref= Reference category

Household income and employment status were not included in the model due to discrepancies between first and second interview

Marital status was not included in the model due to discrepancies between first and 2nd interview.

4.6 DISCUSSION

The Tlokwe sub-district has one of the lowest rates of EBF, for infants up to the age of six months, in SA (Stats SA, 2016). Mothers in this study were mostly Tswana speaking, had a low education level, were unmarried and still living in their parental home. In line with other studies, this study found that the EBF rate decreased with infant age (Oiye *et al.,* 2017; O'Conner *et al.,* 2018; Nieuwoudt *et al.,* 2019). The rate of EBF observed for this study was 70.8% at infant age 3-15 days however, at infant age 4-8 weeks the rate of EBF had dropped to 50.3%.

The increase in the percentages of liquids, such as water and tea, as well solids, such as commercial infant cereals, given at 4-8 weeks explains the drop in the EBF rate observed at time point two. The percentage of infants receiving breastmilk with infant formula, water or solids doubled between the two time points. This is possibly attributable to culture, negative roles of the family in breastfeeding support, or pressure to give liquid and solids as the infant gets older under the assumption that breastmilk is not enough; this belief was reported in other areas of South Africa (Schubl *et al.,* 2014; Chaponda *et al.,* 2017; Jama *et al.,* 2017; Mnyani *et al.,* 2017; Mushaphi *et al.,* 2017). Furthermore, previous studies have found that in certain parts of SA, infants receive water to clean their urine, help with constipation, eliminate acid caused by breastmilk, and to stop hiccups (Nor *et al.*, 2012; Mushaphi *et al.*, 2017).

We observed the use of non-prescriptive medicines, such as Gripe water and Muti wenyoni, with increasing infant age; these medicines are well documented and entrenched as remedies to help infants with cramps and constipation (Schubl *et al.,* 2014). The high rate of Dutch medication, as reported by Schubl *et al.* (2014), is similar to what was observed in this study, particularly among infants age 4-8 weeks.

Mothers reported breastfeeding problems, the most common at infant age 3-15 days being difficulty in expressing breastmilk, painful nipples and poor latching, which often arises as a result of ineffective breastfeeding technique and can disrupt breastfeeding due to stress and pain experienced by the mother (Giugliani, 2004; WHO & UNICEF, 1999). In the current study, mothers who had caesarean-section delivery had more breastfeeding difficulties compared to mothers who had vaginal delivery. This is in agreement with other studies (Veile & Kramer, 2015; Patel & Pusdekar, 2019) that reported that mothers who had a normal vaginal delivery were more likely to practice EBF in comparison to mothers who had a caesarean- section delivery. This may be explained by the separation that occurs between a mother and her infant after the caesarean-section delivery; also, the caesarean-section delivery may be accompanied by complications, resulting in a longer period to initiate breastfeeding.

Although most mothers with breastfeeding difficulties in our study sought assistance from the hospital, some opted to seek help from the family. The reason why some mothers sought help from the family could be due to the family being a defining force in the formation of belief, meanings and conducts of breastfeeding practices (Rempel & Rempel, 2011; Primo *et al.,* 2016; Ferreira *et al.,* 2018).

At infant age 3-15 days, maternal age was significantly associated with EBF. Mothers who were between the ages of 25-29 and 30-35 years were less likely to practice EBF compared to mothers aged 19-24 years old. A systematic review by Boccolini *et al*. (2015) and Mnyani *et al.* (2017) showed that older mothers have a higher possibility of having more breastfeeding experience, thus giving them an added advantage and may increase the likelihood of EBF. However, findings regarding EBF and maternal age are still inconsistent (Kitano *et al.,* 2015).

Maternal education level was also significantly associated with EBF at infant age 3-15 days. Mothers who had an educational level ≥Grade 12 were more likely to exclusively breastfeed compared to mothers with a lower educational level. This is in agreement with Srivasrava & Awasthi (2013), Boccolini *et al.* (2015), Yalcin *et al.* (2016) and Mnyeni *et al.* (2017) who found that higher education level was associated with increased likelihood of EBF. Conversely, other South African studies found that mothers with a higher education level were less likely to EBF (Zulliger *et al.*, 2013; Mnyani *et al.,* 2017; Horwood *et al.,* 2018), which could be due to the fact that mothers with higher educational level had to go back to work or school.

In this study, there was no statistical associations between socio-demographic variables and EBF at infant age 4-8 weeks. The main finding of this study was that the mother's education status and age were associated with EBF at infant age 3-15 days, but were not associated with continuation of EBF at 4-8 weeks. These results may further imply that optimal feeding practices are not followed with increased infant age and additional research is warranted to investigate the interaction between mother`s socio-demographic variables at infant age 4-8 weeks.

The study is not without some limitations. We were not able to use some data due to inconsistent response between the two time points. Furthermore, the small sample size attained was due to the difficulty of getting hold of mothers with infants aged 14 days at date of data collection and only including mothers aged 19 years and above; this might have limited the ability to detect statistically significant associations between EBF and related factors at the two time points. The study has some strengths, such as being a cohort study, and information on breastfeeding status was available from the first period.

4.7 Conclusion and recommendations

This study shows EBF rate changed over a relatively short period. Introduction of liquids, such as water, was as early as the first 15 days of infant's life and the number of infants receiving liquids increased at time-point two. The increased rate of other liquids and solids at infant age 4-8 weeks is indicative of the importance of strengthening EBF promotion. Interventions aimed at achieving optimal breastfeeding practices should target all mothers, particularly mothers with lower level of education and mothers aged 25-29 and 30-35 years during infant age 3-15 days. In the future, qualitative approaches would be quite valuable in further elucidating the nature of infant feeding practices at these postpartum times.

4.8 Key messages

1. EBF rate changed over a relatively short time, from 70.8% at infant age 3-15 days to 50.3% at infant age 4-8 weeks.
2. Mothers between the ages of 25-29 and 30-35 years compared to younger mothers and mothers with lower educational levels were less likely to practice EBF at infant age 3-15 days.

References

Boccolini, C.S., de Carvalho, M.L. & de Oliveira, M.I.C. (2015). Factors associated with exclusive breastfeeding in the first six months of life in Brazil: a systematic review. *Revista de Saude Publica*, 49, 91.

Chaponda, A., Goon, D.T. & Hoque, M.E. (2017). Infant feeding practices among HIV-positive mothers at Tembisa hospital, South Africa. *African Journal of Primary Health Care & Family Medicine*, 9, 1-6.

Ferreira, T., Piccioni, L. D., Queiroz, P., Silva, E. M., & Vale, I. (2018). Influence of grandmothers on exclusive breastfeeding: cross-sectional study. *Einstein (Sao Paulo)*, 16(4).

Giugliani, E.R. J. (2004). Common problems during lactation and their management. *Journal de Pediatria*, 80 (5), s147-s154.

Goosen, C., McLachlan, M. & Schübl, C. (2014). Infant feeding practices during the first 6 months of life in a low-income area of the Western Cape Province. *South African Journal of Child Health*, 8(2):50-54.

Horwood, C., Haskins, L., Engebretsen, I., Phakathi, S., Connolly, C., Coutsoudis, A. & Spies, L. (2018). Improved rates of exclusive breastfeeding at 14 weeks of age in KwaZulu Natal, South Africa: what are the challenges now? *BMC Public Health*, 18(1), 757.

Human Science Research Council (HSRC). (2013). The South African National Health and Nutrition Examination Survey (SANHANES-1). Data analysis on infant feeding practices and anthropometry in children under five years of age: South Africa 2012. Pretoria.

Jama, N.A., Wilford, A., Masango, Z., Haskins, L., Coutsoudis, A., Spies, L. & Horwood, C. (2017). Enablers and barriers to success among mothers planning to exclusively breastfeed for six months: a qualitative prospective cohort study in KwaZulu-Natal, South Africa. *International Breastfeeding Journal*, 12(1), 43.

Kitano, N., Nomura, K., Kido, M., Murakami, K., Ohkubo, T., Ueno, M., Sugimoto, M. (2015). Combined effects of maternal age and parity on successful initiation of exclusive breastfeeding. *Preventive Medicine Reports* 3(1), 121-126.

Kramer, M.S. & Kakuma, R. (2004). The optimal duration of exclusive breastfeeding*. Advanced Experimental Medicine and Biology,* 554, 63-77.

Ladzani, R., Peltzer, K., Mlambo, M. G., & Phaweni, K. (2011). Infant-feeding practices and associated factors of HIV-positive mothers at Gert Sibande, South Africa. *Acta Paediatrica*, 100(4), 538-542.

Lamberti, L.M., Walker, C.L.F., Noiman, A., Victora, C. & Black, R.E. (2011). Breastfeeding and the risk for diarrhea morbidity and mortality. *BMC Public Health*, 11(3), S15.

Mnyani, C.N., Tait, C.L., Armstrong, J., Blaauw, D., Chersich, M.F., Buchmann, E.J., Peters, R.P. & McIntyre, J.A. (2017). Infant feeding knowledge, perceptions and practices among women with and without HIV in Johannesburg, South Africa: a survey in healthcare facilities. *International Breastfeeding Journal*, 12(1), 17.

Mushaphi, L.F., Mahopo, T.C., Nesamvuni, C.N., Baloyi, B., Mashau, E., Richardson, J., … Bessong, P. (2017). Recommendations for infant feeding policy and programs in Dzimauli region, South Africa: results from the MAL-ED birth cohort. *Food and Nutrition Bulletin*, 38(3), 428-440.

National Department of Health (NDoH), Statistics SA (Stats SA), South African Medical Research Council (SAMRC), & ICF (2017). *South Africa Demographic and Health Survey 2016: Key indicators.* Pretoria, South Africa, and Rockville, Maryland, USA: NDoH, Stats SA, SAMRC and ICF.

Nieuwoudt, S., Manderson, L. & Norris, S.A. (2018). Infant feeding practices in Soweto, South Africa: Implications for healthcare providers. *South African Medical Journal*, 108,756-762.

Nieuwoudt, S.J., Ngandu, C.B., Manderson, L & Norris, S.A. (2019). Exclusive breastfeeding policy, practice and influences in South Africa, 1980 to 2018: A mixed-methods systematic review. *PloS one,* 14(10).

Nor, B., Ahlberg, B.M., Doherty, T., Zembe, Y., Jackson, D., Ekström, E.C. & Group, P.E.S. (2012). Mother's perceptions and experiences of infant feeding within a community-based peer counselling intervention in South Africa. *Maternal & Child Nutrition*, 8(4), 448-458.

O'Connor, M., Allen, M.J., Kelly, J., Gao, Y. & Kildea, S. (2018). Predictors of breastfeeding exclusivity and duration in a hospital without Baby Friendly Hospital Initiative accreditation: A prospective cohort study. *Woman and Birth,* 31(4), 319-324.

Oiye, S., Mwanda, W., Mugambi, M., Filteau, S. & Owino, V. (2017). Exclusive breastfeeding is more common among HIV-infected than HIV-uninfected Kenyan mothers at 6 weeks and 6 months postpartum. *Breastfeeding Medicine,* 12(5), 283-289.

Patel, A. & Pusdekar, Y. (2019). Antenatal and Postnatal Counseling Support for Improving Breastfeeding Practices. *Indian Paediatrics,* 56(2), 107-108.

Primo, C.C., de Oliveira Nunes, B., Bruna, de Fátima Almeida Lima, E., Marabotti Costa Leite, F., Barros de Pontes, M., & Gomes Brandão, M. A. (2016). Which factors influence women in the decision to breastfeed? *Investigación y Educación en Enfermería*, 34(1), 198-217.

Rempel, L.A., Rempel, J.K. (2011). The breastfeeding team: the role of involved fathers in the breastfeeding family. *Journal of Human Lactation*, 27(2), 115–121.

Rollins, N.C., Bhandari, N., Hajeebhoy, N., Horton, S., Lutter, C.K., Martines, J.C., Piwoz, E.G., …. (2016). Why invest, and what it will take to improve breastfeeding practices? *The Lancet*, 387 (10017), 491-504.

Rothman, M., Faber, M., Covic, N., Matsungo, T.M., Cockeran, M., Kvalsvig, J.D. & Smuts, C.M. (2018). Infant development at the age of six months in relation to feeding practices, iron status, and growth in a peri-urban community of South Africa. *Nutrients,*10(1), 73.

Schubl, C., Goosen, C. & McLachlan, M. (2014). Factors impeding exclusive breastfeeding in a low-income area of the Western Cape province of South Africa. *Africa Journal of Nursing and Midwifery*, 16(1), 13-31.

Siziba, L., Jerling, J., Hanekom, S. & Wentzel-Viljoen, E. (2015). Low rates of exclusive breastfeeding are still evident in four South African provinces. *South African Journal of Clinical Nutrition*, 28(4), 170-179.

Srivastava, N. M., & Awasthi, S. (2014). Breastfeeding practices for newborns among urban poor in Lucknow, northern India: A prospective follow-up study. *Clinical Epidemiology and Global Health*, *2*(2), 66-74.

Statistics South Africa. (2018). Provincial profile: North West Community Survey 2016. http://cs2016.statssa.gov.za/wp-content/uploads/2018/07/NorthWest.pdf. Date of access: 17 July 2019.

Tlokwe City Council (2015). Tlokwe Cty Council Annual Report 2013/2014. Potchefstroom.

United Nations Children's Fund (UNICEF) (2019). Neonatal mortality. https://data.unicef.org/topic/child-survival/neonatal-mortality/. Date of access: 7 November 2019.

Veile, A., & Kramer, K. (2015). Birth and breastfeeding dynamics in a modernizing indigenous community. *Journal of Human Lactation*, *31*(1), 145-155.

Victoria, C. (2000). Effect of breastfeeding on infant and child mortality due to infectious diseases in less developed countries: a pooled analysis. *Lancet (British Edition)*, 355(9202), 451-455.

World Health Organization & United Nations Children's Fund. (1999). Breastfeeding counselling, a training course, participants' manual part three. https://www.who.int/nutrition/publications/infantfeeding/bf_counselling_participants_manual3.pdf. Date of access: 15 November 2019.

World Health Organization. (2003). Global strategy for infant and young child feeding: Geneva: World Health Organization.

World Health Organization. (2008). Indicators for assessing infant and young child feeding practices : conclusions of a consensus meeting held 6–8 November 2007 in Washington D.C., USA. Geneva: World Health Organization.

World Health Organization (2010). Early Initiation of breastfeeding: the key to survival and beyond: WHO Secretariat. http://new.paho.org/hq/dmdocuments/2010/Eight%20Pager%20English%20FINAL. Date of access: 7 November 2019.

Yalçin, S. S., Berde, A. S., & Yalçin, S. (2016). Determinants of exclusive breast feeding in sub-Saharan Africa: a multilevel approach. *Paediatric and Perinatal Epidemiology*, *30*(5), 439-449.

Zulliger, R., Abrams, E.J. & Myer, L. (2013). Diversity of influences on infant feeding strategies in women living with HIV in Cape Town, South Africa: a mixed methods study. *Tropical Medicine & International Health*, 18(12), 1547-1554.

CHAPTER 5: SUMMARY OF STUDY FINDINGS, LIMITATIONS, STRENGTHS, CONCLUSION AND RECOMMENDATIONS

This chapter provides a summary of the key findings of the study in relation to the objectives. Furthermore, this chapter includes recommendations for future research.

The aim of this study was to determine factors associated with EBF amongst a cohort of mothers with infants aged 0-8 weeks in the Tlokwe sub-district, North West Province, South Africa.

5.1 Summary of findings

The first objective of this study was to determine the infant feeding practices of a cohort of mothers with infants aged 0-8 weeks. Most mothers were still breastfeeding at infant age 4-8 weeks (90.7%), which was much higher than the national figure of 71% for the same age group. As expected, EBF was higher (70.8%) at infant age 3-15 days, than at infant age 4-8 weeks (50.3%). At both time points, EBF was higher than the national figure (NDoH, Stats SA, SAMRC & ICF, 2017). The decreased EBF rate at infant age 4-8 weeks was explained by the increased number of infants receiving formula milk, water, and to a lesser extent, solids with increased infant age. As reported by other studies (Schubl *et al.,* 2014; Chaponda *et al.,* 2017; Jama *et al.,* 2017; Mnyani *et al.,* 2017; Mushaphi *et al.,* 2017), mixed feeding was also the most common infant feeding practice in this study. The number of infants that were breastfeeding and receiving plain water in this study was 25.5% at infant age 3-15 days, which increased to 40.4 % at infant age 4-8 weeks. Despite the high level of unemployment in this study (67.7%), 11.8% of mothers with infants 3-15 days practised mixed feeding with formula feeds, which was almost double at 4-8 weeks (21.7%). As supported by Nor *et al.* (2012), Schubl *et al.* (2014) and Mushaphi *et al.* (2017), the percentage of mothers giving water, and non-prescriptive medicines also increased between the two time points.

Despite more mothers having two or more children (36.6%), almost one third of mothers (28.6%) reported to have experienced breastfeeding problems. Given that caesarean-section delivery has been established as a negative impact on EBF (Hobbs *et al*., 2016), it was not surprising that the majority of mothers who had caesarean-sections reported having had breastfeeding difficulties. Most mothers had received help in the hospital or from family illustrating that breastfeeding difficulties were most prevalent during the early postpartum period.

The second objective of this study was to determine the association between socio-demographic factors and EBF among a cohort of mothers with infants aged 0-8 weeks.

Only at infant age 3-15 days was maternal age and educational level associated with EBF. Compared to mothers in the age category 19-24 years, mothers between the age categories of 25-29 and 30-35 years were less likely to practise EBF. Younger mothers were more likely to be first time mothers and were not financially independent therefore making access to formula milk very difficult. Our study found that mothers older than 35 years were also more likely to EBF, a finding supported by a systematic review (Boccolini *et al.,* 2015), that reported that older mothers are more likely to have more breastfeeding experience, thus giving them the confidence to EBF.

Mothers with Grade 12 or more were three times more likely to exclusively breastfed compared to mothers with less than Grade 12 educational level. As found by international evidence (Boccolini *et al.,* 2015), the findings from this study showed that higher education was associated with EBF, which was not supported by local South African studies (Zulliger *et al.*, 2013; Mnyani *et al*., 2017; Horwood *et al.,* 2018). Maternal education level was also significantly associated with EBF at infant age 3-15 days. Mothers who had an educational level higher than Grade 12 were more likely to exclusively breastfeed compared to mothers who had a lower educational level. In agreement with Boccolini *et al.* (2015), mothers who have a higher education level have been associated with an increased likelihood to exclusively breastfeed. Unlike this study, some South African studies (Jama *et al.*, 2017; Mnyani *et al.*, 2017; Horwood *et al.*, 2018) found that mothers with a higher education level were less likely to exclusively breastfeed and this was apparent with mothers who had to go back to work or school.

None of the socio-demographic variables were significantly associated with EBF at infant age 4-8 weeks given the low percentage (50.3%) of EBF mothers, resulting in a low sample size.

5.2 Study strengths and limitations

The main limitation of the study was the small sample size due to the difficulty of getting hold of some mothers with infants aged 14 days at date of data collection. This could have limited the ability to detect statistically significant associations between EBF and related factors at the two time points. This study was a community-based study, which excluded mothers younger than 18 years of age. According to Stats SA (2017), 10.9% of teenage girls fall pregnant in South Africa, therefore this exclusive criterion reduced the number of mothers that could participate in this study. Another study limitation was cultural practices, followed by mothers in our study sites. We could not access some mothers until a certain period, which exceeded the period to collect data

at time point one. Despite the limitations, the study had some strengths, such as being a cohort study, information on breastfeeding status was available from the infants at a young age and followed up until they were eight weeks. The study may be used as a basis in the development of a larger study. Furthermore, this study has contributed to infant feeding data in the North West Province.

5.3 Conclusion

The majority of mothers practiced breastfeeding at 4-8 weeks indicating that breastfeeding was not a major problem in our cohort, but rather failure to exclusively breastfeed and maintain EBF. The increased rate of other liquids and solids at infant age 4-8 weeks is indicative of the importance of strengthening EBF promotion. Also, interventions aimed at achieving optimal breastfeeding practices should target all mothers, particularly mothers with lower level of education. In the future, qualitative approaches would be quite valuable in further elucidating the nature of infant feeding practices at these postpartum time periods.

5.4 Recommendations for future research

1. In the future, qualitative approaches would be quite valuable in further elucidating the nature of infant feeding practices at these postpartum periods, as it will provide more depth, openness and details with regard to factors associated with EBF at these time points.
2. The finding of this study showed that mother's education and age had an association to EBF at infant age 3-15 days, but we did not find the same association when the infants were older therefore, further research may be needed.
3. Future studies should consider other breastfeeding practices (such as initial breastfeeding and pre-lacteal feeding), which were not considered in this study.
4. Future studies could measure duration of EBF breastfeeding as a continuous scale and use an approach such as survival analysis to measure the probability of stopping breastfeeding.

5.5 Recommendations for policy and practise

1. EBF and other breastfeeding practices changed over a relatively short period of time. There is therefore, a need for sustained education, information, and counselling during these periods (3-15 days and 4-8 weeks) to improve breastfeeding practices, which in turn will help in decreasing infant mortality and morbidity.

2. Breastfeeding information, education and counselling should target all mothers during the prenatal periods, but most especially mothers with lower educational levels and mothers aged 25-29 and 30-35 years of age compared to younger mothers.

References

Boccolini, C. S., Carvalho, M. L. D., & Oliveira, M. I. C. D. 2015. Factors associated with exclusive breastfeeding in the first six months of life in Brazil: a systematic review. *Revista de saude publica, 49*, 91.

Chaponda, A., Goon, D.T. & Hoque, M.E. 2017. Infant feeding practices among HIV-positive mothers at Tembisa hospital, South Africa. *African journal of primary health care & family medicine*, 9:1-6.

Hobbs, A. J., Mannion, C. A., McDonald, S. W., Brockway, M., & Tough, S. C. 2016. The impact of caesarean section on breastfeeding initiation, duration and difficulties in the first four months postpartum. *BMC pregnancy and childbirth*, *16*(1), 90.

Horwood, C., Haskins, L., Engebretsen, I., Phakathi, S., Connolly, C., Coutsoudis, A. & Spies, L. 2018. Improved rates of exclusive breastfeeding at 14 weeks of age in KwaZulu Natal, South Africa: what are the challenges now? *BMC Public Health*, 18(1), 757.

Jama, N.A., Wilford, A., Masango, Z., Haskins, L., Coutsoudis, A., Spies, L. & Horwood, C. 2017. Enablers and barriers to success among mothers planning to exclusively breastfeed for six months: a qualitative prospective cohort study in KwaZulu-Natal, South Africa. *International breastfeeding journal*, 12(1):43.

Mnyani, C.N., Tait, C.L., Armstrong, J., Blaauw, D., Chersich, M.F., Buchmann, E.J., Peters, R.P. & McIntyre, J.A. 2017. Infant feeding knowledge, perceptions and practices among women with and without HIV in Johannesburg, South Africa: a survey in healthcare facilities. *International breastfeeding journal*, 12(1):17.

Mushaphi, L.F., Mahopo, T.C., Nesamvuni, C.N., Baloyi, B., Mashau, E., Richardson, J., Dillingham, R., Guerrant, R., Ambikapathi, R. & Bessong, P. 2017. Recommendations for infant feeding policy and programs in Dzimauli region, South Africa: results from the MAL-ED birth cohort. *Food and nutrition bulletin*, 38(3):428-440.

National Department of Health (NDoH), Statistics SA (Stats SA), South African Medical Research Council (SAMRC), & ICF. 2017. *South Africa Demographic and Health Survey 2016: Key indicators.* Pretoria, South Africa, and Rockville, Maryland, USA: NDoH, Stats SA, SAMRC and ICF.

Nor, B., Ahlberg, B.M., Doherty, T., Zembe, Y., Jackson, D., Ekström, E.C. & Group, P.E.S. 2012. Mother's perceptions and experiences of infant feeding within a community-based peer counselling intervention in South Africa. *Maternal & child nutrition*, 8(4), 448-458.

Schubl, C., Goosen, C. & McLachlan, M. 2014. Factors impeding exclusive breastfeeding in a low-income area of the Western Cape province of South Africa. *Africa journal of nursing and midwifery*, 16(1):13-31.

Statistics South Africa, 2017. Recorded live births. www.statssa.gov.za/publications/P0305/Recorded_Live_Births_2017.pdf#page=19. Date of access: 7 Feb 2020.

Zulliger, R., Abrams, E.J. & Myer, L. 2013. Diversity of influences on infant feeding strategies in women living with HIV in Cape Town, South Africa: a mixed methods study. *Tropical medicine & international Health*, 18(12): 1547-1554.

ANNEXURES

ANNEXURE A: Author's guidelines for the journal Maternal and Child Nutrition

Author Guidelines

The scope of *Maternal & Child Nutrition* includes pre-conceptual nutrition, antenatal and postnatal maternal nutrition, women's nutrition throughout their reproductive years, and fetal, neonatal, infant and child nutrition, up to and including adolescence. The Journal welcomes submission of (1) Original Research Papers, (2) Systematic Reviews that provide original information on maternal and/or child nutrition and (3) Letters to the Editor (Correspondence), usually commenting on a recent publication in the journal. The journal also publishes Special Issues, which bring together collections of papers on a particular theme, usually edited by a Guest Editor, and subject to customary reviewing process.

Online Submission

Please submit your manuscript online at http://mc.manuscriptcentral.com/mcn. Manuscripts should be uploaded as Word (.doc) or Rich Text Format (.rft) files (not write-protected) plus separate figure files. GIF, JPEG, PICT or Bitmap files are acceptable for submission, but only high-resolution TIF or EPS files are suitable for printing. For more information on preparing the manuscripts for online submission, please read the detailed instructions at http://mc.manuscriptcentral.com/mcn. Additional help is available by emailing ts.mcsupport@thomson.com. At the time of submission, authors are asked to make a declaration of any competing interests and to state their individual contributions to the work.

Contact details for The Editorial Office:

Editorial Office (Maternal & Child Nutrition) University of Central Lancashire School of Health Preston PR1 2HE, UK Tel: +44 (0) 1772 893830; fax +44 (0) 1772 892 914 E-mail enquiries: MCNJournal@uclan.ac.uk

Format of Manuscripts

All manuscripts submitted to *Maternal & Child Nutrition* should include: title page, abstract and keywords, main text, key messages, acknowledgements, source of funding, conflict of interest statement, contributor statement, references, tables and figures.

Maternal & Child Nutrition uses double-blinded review. Please do not include identifying information on any documents other than the Title page.

Title page

Author names, affiliations, and a short running title. Twelve (12) words or less is the recommended length for a title. The word counts for the abstract and the main body of the text (excluding references and legends) should be clearly stated, along with the number of references, tables and figures. Also included on the Title Page should be the following information:

Acknowledgements: Please specify all contributors to the article other than the authors accredited.

Source of funding: Authors are required to specify the source of funding for their research when submitting a paper. Suppliers of materials should be named and their location (town, state/county, country) included. The information will be disclosed in the published article.

Note to NIH Grantees: Pursuant to NIH mandate, Wiley-Blackwell will post the accepted version of contributions authored by NIH grant-holders to PubMed Central upon acceptance. This accepted version will be made publicly available 12 months after publication. For further information, see www.wiley.com/go/nihmandate

Conflict of Interest Statement: Authors are required to disclose any possible conflict of interest. These include financial (for example patent, ownership, stock ownership, consultancies, speaker‟s fee). Information provided at the time of submission will be published, or 'none declared' will appear.

Contributor statement: The contribution of each author should be stated at the time of submission. This information will be published. Please conform to the guidance on manuscript size below. Please ensure that these details are shown on the cover page only, and do not appear on any other page of the manuscript.

Abstract and keywords

Supply an abstract (without subheadings) of up to 250 words. Below the abstract, provide up to six keywords that will assist indexers in cross-indexing your article.

Optimizing Your Abstract for Search Engines

Many students and researchers looking for information online will use search engines such as Google, Yahoo or similar. By optimizing your article for search engines, you will increase the chance of someone finding it. This in turn will make it more likely to be viewed and/or cited in

another work. We have compiled these guidelines to enable you to maximize the web-friendliness of the most public part of your article.

Main text

The main text should be typed double-spaced, include continuous line numbers and structured as follows: introduction; participants (or materials) and methods (including appropriate subsections, e.g. statistical methods); results; discussion; key messages; references; legends to figures; tables; and figures.

Ethics: The ethical aspects of all studies will be noted particularly when assessing manuscripts. All studies using human participants should include an explicit statement in the Methods section identifying the review and ethics committee, institutional council or review board approval for each study, if applicable. Editors reserve the right to reject papers if there is doubt as to whether appropriate procedures have been used.

Units: All measurements should be expressed as SI units. If, however, other units are used, a conversion factor should be included in the Methods section.

Statistical methods: Statistical methods should be described clearly in the methods section with references when appropriate. Editors and referees will be concerned particularly that any study described had sufficient statistical power for its purpose, and where appropriate, considerations of the power of the study should be laid out in the methods section. In the results section 95% confidence intervals should be cited whenever possible for all important endpoints for the study. Please click here for guidance on how to present statistical results.

Key Messages

A key message box should be provided with each manuscript. This should include 3-5 messages on key points of practice, policy or research (the key messages should be between 80-100 words in length).

References

References should be cited using the APA style (American Psychological Association). List all sources in the reference list alphabetically by name. In text citations should follow the author-date method. This means that the author's last name and the year of publication for the source should appear in the text, for example, (Jones, 1998), and a complete reference should appear in the reference list at the end of the paper.

References are styled according to the sixth edition of the *Publication Manual of the American Psychological Association*. A sample of the most common entries in reference lists appears

below. Please note that for journal articles, issue numbers are not included unless each issue in the volume begins with page one.

Journal article: Phelps, L. (1996). Discriminative validity of the WRAML with ADHD and LD children. Psychology in the Schools, 33, 5-12.

Book edition: Bradley-Johnson, S. (1994). Psychoeducational assessment of students who are visually impaired or blind: Infancy through high school (2nd ed.). Austin, TX: Pro-ed.

If a reference has more than 7 authors, list first 6 authors, then ellipses followed by the last author; there should be no et.al.Refer to samples below.

Serdula, M. K., Lundeen, E., Nichols, E. K., Imanalieva, C., Minbaev, M.,Mamyrbaeva, T., … Kyrgyz Republic Working Group. (2013). Effects of a large-scale micronutrient powder and young child feeding education program on the micronutrient status of children 6–24 months of age in the Kyrgyz Republic. European Journal of Clinical Nutrition, 67, 703–707.

Stevens, G. A., Bennett, J. E., Hennocq, Q., Lu, Y., De-Regil, L. M., Rogers, L., … Ezzati, M. (2015). Trends and mortality effects of vitamin A deficiency in children in 138 low-income and middle-income countries between 1991 and 2013: A pooled analysis of population-based surveys.Lancet Global Health, 3, e528–e536.

References should refer only to material listed within the text.

Tables and Figures

Tables: Tables should be numbered consecutively and referred to „Table(s)" in the text. Each table should have a title. Footnotes to tables should be typed below the table and should be referred to by superscript lowercase letters. No vertical rules should be used. Tables should not duplicate results presented elsewhere in the manuscript.

Figures: Figures should be no larger than A4 and should be in a suitable form for reproduction. Photographs, charts and diagrams are all to be referred to as „Figure(s)" and should be numbered consecutively in the order to which they are referred. They should accompany the manuscript, but should not be included within the text. Each figure should have a title and a legend and all legends should be typed together on a separate sheet and numbered correspondingly. Please send electronic versions of your figures. For more information, please visit http://authorservices.wiley.com/authors/digill.asp.

Preparation of Electronic Figures for Publication

Although low quality images are adequate for review purposes, print publication requires high quality images. Submit EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Do not use pixel-oriented programs.

Scans (TIFF only) should have a resolution of at least 300 dpi (halftone) or 600 to 1200 dpi (line drawings) in relation to the reproduction size (see below). Please submit the data for figures in black and white or submit a Colour Work Agreement Form (see Colour Charges below). EPS files should be saved with fonts embedded (and with a TIFF preview if possible).

For scanned images, the scanning resolution (at final image size) should be as follows to ensure good reproduction: line art: >600 dpi; halftones (including gel photographs): >300 dpi; figures containing both halftone and line images: >600 dpi. You may check your electronic artwork before submitting it at http://authorservices.wiley.com/bauthor/eachecklist.asp

Further information can be obtained at Wiley-Blackwell‟s guidelines for figures: http://authorservices.wiley.com/bauthor/illustration.asp

Word limits

Original Research Papers

Original research paper should be no longer than 5,000 words (not including abstract, references, tables and figures). Manuscripts should include a maximum of 5 Figures and/or tables. Additional tables or figures and/or extra methodological detail can be included in a separate Supplementary Appendix. In exceptional cases MCN will consider submission of manuscripts longer in length, but this should be negotiated with the Editor prior to submission. The production and handling Editors may relocate tables or figures into a Supplementary Appendix prior to the production of page proofs if the manuscript exceeds these specifications at the time of final acceptance.

Review Articles

High quality review articles should provide novel insights, analysis and interpretation of the published literature and offer a balanced critical appraisal of established or emerging issues related to maternal and child nutrition. Review Articles should not exceed 5,000 words and 100 references. Additional data (e.g. Tables) can be provided as a Supplementary Appendix. The handling Editor may relocate tables or figures into a Supplementary Appendix if the manuscript exceeds these specifications and/or 12 printed pages.

Letters to the Editor

Correspondence relating to work that has been published in the journal, and/or other brief comments, case reports or observations, may be submitted as a succinct Letter to the Editor.

Clinical Trials

Clinical trials should be reported using the CONSORT guidelines available at www.consort-statement.org. A CONSORT checklist should also be included in the submission material (http://www.consort-statement.org/mod_product/uploads/CONSORT 2001 checklist.doc).

Manuscripts reporting results from a clinical trial must provide the registration number and name of the clinical trial. Clinical trials can be registered in any of the following free, public clinical trials registries: www.clinicaltrials.gov, clinicaltrials-dev.ifpma.org, isrctn.org. The clinical trial registration number and name of the trial register will be published with the paper.

Editing

All manuscripts are subject to editing for length, clarity and conformity with *Maternal & Child Nutrition* style. Word count limitations should be observed. Tables and figures will be published as supporting information if the proofs of the manuscript exceed 12 print pages. Authors should retain a copy of their manuscript since no responsibility can be accepted for damage or loss of papers.

Language

The language of publication is English. Authors for whom English is a second language must have their manuscript professionally edited by an English speaking person before submission to make sure the English is of high quality. It is preferred that manuscripts are professionally edited. A list of independent suppliers of editing services can be found at http://authorservices.wiley.com/bauthor/english_language.asp. All services are paid for and arranged by the author, and use of one of these services does not guarantee acceptance or preference for publication.

Publication Ethics

Maternal & Child Nutrition adheres to the below ethical guidelines for publication and research.

Authorship and Acknowledgements

Authorship: Authors submitting a paper do so on the understanding that the manuscript has been read and approved by all authors and that all authors agree to the submission of the manuscript to the journal. ALL named authors must have made an active contribution to the conception and design and/or analysis and interpretation of the data and/or the drafting of the paper and ALL must have critically reviewed its content and have approved the final version submitted for publication. Participation solely in the acquisition of funding or the collection of

data does not justify authorship and, except in the case of complex large-scale or multi-centre research, the number of authors should not exceed six.

Maternal & Child Nutrition adheres to the definition of authorship set up by The International Committee of Medical Journal Editors (ICMJE). According to the ICMJE authorship criteria should be based on

1. substantial contributions to conception and design of, or acquisition of data or analysis and interpretation of data,
2. drafting the article or revising it critically for important intellectual content and
3. final approval of the version to be published.

Authors should meet conditions 1, 2 and 3. It is a requirement that all authors have been accredited as appropriate upon submission of the manuscript. Contributors who do not qualify as authors should be mentioned under Acknowledgements.

Permissions

If all or parts of previously published illustrations are used, permission must be obtained from the copyright holder concerned. It is the author's responsibility to obtain these in writing and provide copies to the Publishers.

Plagiarism

Any material reproduced or quoted from other sources must be clearly indicated as such. The editors will advise whether or not the original author‟s or copyright holder‟s consent is needed.

MCN is a member of CrossCheck by CrossRef and iThenticate. iThenticate is a plagiarism screening service that verifies the originality of content submitted before publication. iThenticate checks submissions against millions of published research papers, and billions of web content. Authors, researchers and freelancers can also use iThenticate to screen their work before submission by visiting www.ithenticate.com.

Appeal of Decision

The decision on a paper is final and cannot be appealed.

AFTER ACCEPTANCE

Upon acceptance of a paper for publication, the manuscript will be forwarded to the production editor who is responsible for the production of the journal.

Copyright Transfer Agreement

If your paper is accepted, the author identified as the formal corresponding author for the paper will receive an email prompting them to login into Author Services; where via the Wiley Author

Licensing Service (WALS) they will be able to complete the license agreement on behalf of all authors on the paper.

For authors signing the copyright transfer agreement

If the OnlineOpen option is not selected the corresponding author will be presented with the copyright transfer agreement (CTA) to sign. The terms and conditions of the CTA can be previewed in the samples associated with the Copyright FAQs.

For authors choosing OnlineOpen

If the OnlineOpen option is selected the corresponding author will have a choice of the following Creative Commons License Open Access Agreements (OAA):

Creative Commons Attribution License OAA Creative Commons Attribution Non-Commercial License OAA Creative Commons Attribution Non-Commercial -NoDerivs License OAA

To preview the terms and conditions of these open access agreements please visit the Copyright FAQs hosted on Wiley Author Services and visit http://www.wileyopenaccess.com/details/content/ 12f25db4c87/Copyright--License.html.

If you select the OnlineOpen option and your research is funded by The Wellcome Trust and members of the Research Councils UK (RCUK) you will be given the opportunity to publish your article under a CC-BY license supporting you in complying with Wellcome Trust and Research Councils UK requirements. For more information on this policy and the Journal"s compliant self-archiving policy please visit: http://www.wiley.com/go/funderstatement.

For RCUK and Wellcome Trust authors click on the link below to preview the terms and conditions of this license: Creative Commons Attribution License OAA. To preview the terms and conditions of these open access agreements please visit the Copyright FAQs hosted on Wiley Author Services and visit http://www.wileyopenaccess.com/details/content/12f25db4c87/Copyright--License.html.

Proof Corrections

The corresponding author will receive an e-mail alert containing a link to a website. A working e-mail address must therefore be provided for the corresponding author. The proof can be downloaded as a PDF (portable document format) file from this site. Acrobat Reader will be required in order to read this file. The software can be downloaded (free of charge) from the following web site: http://www.adobe.com/products/acrobat/readstep2.html.

This will enable the file to be opened, read on screen, and printed out in order for any corrections to be added. Further instructions will be sent with the proof. Excessive changes made by the author in the proofs, excluding typesetting errors, will be charged separately.

Author Services

Author Services enables authors to track their article - once it has been accepted - through the production process to publication. Authors can check the status of their articles online and choose to receive automated e-mails at key stages of production. The author will receive an e-mail with a unique link that enables them to register and have their article automatically added to the system. Please ensure that a complete e-mail address is provided when submitting the manuscript. Visit http://authorservices.wiley.com/bauthor/ for more details on online production tracking and for a wealth of resources including FAQs and tips on article preparation, submission and more.

Early View

Maternal & Child Nutrition offers Early View for all manuscripts. This service ensures that all accepted and proofed manuscripts are published online very soon after proofing but before inclusion in a full issue.

OnlineOpen

OnlineOpen is available to authors of primary research articles who wish to make their article available to non-subscribers on publication, or whose funding agency requires grantees to archive the final version of their article. With OnlineOpen, the author, the author's funding agency, or the author's institution pays a fee to ensure that the article is made available to non-subscribers upon publication via Wiley Online Library, as well as deposited in the funding agency's preferred archive. For the full list of terms and conditions, see http://olabout.wiley.com/WileyCDA/Section/id-406241.html. Prior to acceptance there is no requirement to inform an Editorial Office that you intend to publish your paper OnlineOpen if you do not wish to. All OnlineOpen articles are treated in the same way as any other article. They go through the journal's standard peer-review process and will be accepted or rejected based on their own merit.

Author material archive policy

Please note that, unless specifically requested, Wiley-Blackwell will dispose of all hardcopy or electronic material submitted 2 months after publication. If you require the return of any material

submitted, please inform the Editorial Office or Production Editor as soon as possible if you have not yet done so.

Manuscript referrals to the open access journal Food Science & Nutrition

This journal works together with Wiley's open access journal, Food Science & Nutrition, to enable rapid publication of good quality research that is unable to be accepted for publication by our journal. Authors may be offered the option of having the paper, along with any related peer reviews, automatically transferred for consideration by the Editor of *Food Science & Nutrition*. Authors will not need to reformat or rewrite their manuscript at this stage, and publication decisions will be made a short time after the transfer takes place. The Editor of *Food Science & Nutrition* will accept submissions that report well-conducted research which reaches the standard acceptable for publication. *Food Science & Nutrition* is a Wiley Open Access Journal and article publication fees apply. For more information, please go to www.foodscience-nutrition.com.details on online production tracking and for a wealth of resources including FAQs and tips on article preparation, submission and more.

eLocator

Maternal and Child Nutirion now uses eLocators instead of page numbers. The use of eLocators supports Wiley‟s transition from print, page-based publication workflows to a modern, web-first environment that reflects the future of journal publishing. eLocators are unique identifiers for an article that serve the same function page numbers have traditionally served in the print world. Your article will now have a unique identifier (eLocator) instead of a page number. The eLocator will become the primary means of citation, just as page numbers have been in the past. The eLocator appears as the last identifier in a citation, replacing the page number. For further details, you can refer the eLocators page on the Author Guidelines page of the journal

ANNEXURE B: Informed consent form

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT

Health Research Ethics Committee
Faculty of Health Sciences
NORTH-WEST University
(Potchefstroom Campus)
2017 -09- 19
HREC Stamp

Informed consent form for study participants in the breastfeeding self-efficacy scale- short form (BSES-SF) tool validation study

TITLE OF THE RESEARCH STUDY: Mothers' breastfeeding experiences and practices: An explorative mixed methods study in the sub-district of Tlokwe, North West Province, South Africa

REFERENCE NUMBERS: NWU-00030-17-S1

PRINCIPAL INVESTIGATOR: Prof Salome Kruger
PROJECT LEADER: Chantell Witten

ADDRESS: North-West University, Potchefstroom, Center of Excellence for Nutrition

CONTACT NUMBER: 072 737 2235
(If not available Chantell Witten, 071 485 5893)

You are invited to take part in our research study that is testing an international research tool that measures breastfeeding motivation (self-efficacy) of mothers. This tool has never been used in South Africa. This will be the very first time the tool is tested in South Africa in our local languages. This research study is being done by a group of researchers who are all qualified in the field of nutrition and social behaviour. Please take some time to read the information presented herein, which explains the details of this study. Please ask the researcher any questions about any part of this study that you do not fully understand. It is very important that you are fully satisfied that you clearly

understand what this research study involves. Also, your participation is **entirely voluntary** and you are free to decline or withdraw from the study at any point in time. If you say no, this will not affect you negatively in any way, whatsoever.

This study has been approved by the **Health Research Ethics Committee of the Faculty of Health Sciences of the North-West University (NWU-00030-17-S1)** and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki and the ethical guidelines of the National Department of Health. It might be necessary for the research ethics committee members or relevant authorities to inspect the study records at any point in time with or without prior notification.

What is this research study all about?
South Africa has very low exclusive breastfeeding (EBF) rates that negatively affect the health and wellbeing of babies. We do not fully understand why mothers struggle to breastfeed their babies optimally and struggle to exclusively breastfeed for the full six months, from birth until the baby is six months old. This study will examine and describe using questionnaires you will answer to study the breastfeeding practices and the research tool measures of mothers motivation for breastfeeding. This study will look at the baby's feeding pattern and how the mother feels about breastfeeding.

Why have you been invited to participate?
- You are invited to participate because you are pregnant and will soon have a baby
- You are invited because you are older than 19 years of age.
- You have decided to breastfeed your baby
- You live in the area where the study is taking place
- You attend one of the clinics in the area where the study is taking place

What will your responsibilities be?
- With the help of a fieldworker, you will be asked to complete a questionnaire that has 14 questions This will take 30 -45 minutes to complete.
- You will be asked these questions once after your baby arrives. This may be on the day your baby is born or within the first 5 days after the birth of your baby
- You will be asked baby feeding questions between Day 1 and 5 after your baby's birth and then again when your baby is 6 weeks old.
- When you baby is 6 weeks old, with the help of a fieldworker, you will be asked to complete a different questionnaire that has 10 questions. This will take 20 -30 minutes to complete

Will you benefit from taking part in this study?
There is no direct benefit to you but there will be greater benefit to all the breastfeeding mothers in South Africa. The Table below lists some of the indirect benefits to you and to the breastfeeding mothers of South Africa.

This study will provide you the opportunity to talk openly about your feelings about breastfeeding your baby. You may be happy to know that researchers and government health programmes are very interested to know what are the difficulties in breastfeeding successfully and want to make it easier for future mothers to breastfeed successfully.

Table 7.1b: Direct benefits for the participants whom participate in the proposed study as well as indirect benefits for researchers and the breastfeeding programme in South Africa	
Direct benefits for participants	**Indirect benefits for researchers or the community**
There are no direct benefits to you as a participant	If the 24 hour recall identifies mothers having difficulties breastfeeding their infants, they will be referred to help via the healthcare system.
	If depressive symptoms are identified after the EPDS has been completed, the mother will be referred to help via the healthcare system.
	Researchers develop a rapport with the community and gain insights into the health system and the experience of child-rearing in the context of low income communities.
	Researchers become more aware of their role as change agents and not only problem identifiers.

Are there risks involved in your taking part in this research?
There are minimal risks and the benefits outweigh the risks by creating a safe and protected space for you to talk openly about your feelings and experiences of breastfeeding your baby. The Table below lists some anticipated risks and the precautions we will take to minimize these risks to you during your participation in the study.

Table Possible risks involved in the proposed study as well as proposed precautions to minimize these anticipated risk

Dangers/risk	**Proposed safety measures**
You may feel stressed or feel uncomfortable by the type of questions you are asked or by the discussion of how you feed your baby.	Open-ended questions conducted by a skilled and competent interviewer who can objectively respond to questions and fears that may arise from the participant. Any discomfort noted can be referred to the appropriate health service such as the CHWs and the clinic. Mothers who are identified with infant feeding problems or coping difficulties will be referred to the local health facility.
Potential identification of postnatal depression through the EPDS screening tool	Participants with high EPDS scores will be reported and referred to the Tlokwe sub-district health services via the Primary Health Care Coordinator Sr. Petro Swanepoel.
Researchers may have a negative interaction with participants	Refresher training on interview techniques and how to handle conflict or tension to support participants will be provided by the skilled research supervisors.

	Researchers will be thoroughly briefed by DoH team on the dynamics between health clients and service providers especially in the wake of negative service delivery protests.
The interview might be time-consuming	The PhD student and the field workers who will conduct the interviews will be trained in interviewing skills to conduct in-depth questionnaires within the agreed time of no more than 45mins in order to ensure efficiency. Participants will not be separated from their infants and will be encouraged to have their infants with them during the sessions to complete questionnaires and the interviews. Participants will receive water and refreshments during interviews and FGDs.

What will happen in the unlikely event of some form of discomfort occurring as a direct result of your taking part in this research study?

- Should you have the need for further discussions after the questionnaires or the interviews, you can inform the researcher immediately or you may contact the researcher and an opportunity will be arranged for you to speak to a counsellor.

Who will have access to the data?

- Only the researcher will have access to the data
- Your name and personal contact details will not be shared with anyone
- The data will not be presented specific to you but for the group.
- All questionnaires and interviews will be conducted at a place of your choice within the study area.
- Confidentiality will be ensured by coding the data collection tools as well as the questionnaire-based interviews.
- Reporting of findings will be anonymous –no name or personal details of you will be used when reporting the findings of the study.
- No data or quotes will be directly linked to you as an individual
- All data will be password protected and kept safe and secure by storing hard copies in locked cupboards in the project leader's office, at the Centre of Excellence for Nutrition (NWU) and the electronic data will be password protected and kept on discs.
- As soon as data has been transcribed it will be deleted from the audio-recorders. Data will be stored for 7 years.

What will happen with the data/samples?

- This is a once off collection and data will be analysed by the researchers of the North-West University.

How will you know about the findings?

- The findings of the research will be shared with you by the research team through information flyer that all the clinics will receive and if needed information sessions

will be held at the clinics to share with mothers and to help other mothers breastfeed successfully.
- Findings will also be shared in a policy information brief to the Department of Health
- Findings will be shared at scientific meetings and published in journals

Will you be paid to take part in this study and are there any costs involved?
No, you will not be paid to take part in the study. There will be no costs involved for you, if you do take part.
- You will receive light refreshments when you are completing the questionnaire and participating in the interviews
- At the end of the study, at the last visit when you baby is six months old, you will receive a Thank you gift for you and your baby.

Is there anything else that you should know or do?
- You can contact Chantell Witten on 071 485 5893 if you have any further queries or encounter any problems.
- You can contact the Health Research Ethics Committee via Mrs Carolien van Zyl at 018 299 2089; carolien.vanzyl@nwu.ac.za if you have any concerns or complaints that have not been adequately addressed by the researcher.
- You will receive a copy of this information and consent form for your own records.

Declaration by participant

By signing below, I ..... agree to take part in the research study **Mothers' breastfeeding experiences and practices: An explorative mixed methods study in the sub-district of Tlokwe, North West Province, South Africa**

I declare that:

- I have read this information/it was explained to me by a trusted person in a language with which I am fluent and comfortable.
- The research was clearly explained to me.
- I have had a chance to ask questions to both the person getting the consent from me, as well as the researcher and all my questions have been answered.
- I understand that taking part in this study is voluntary and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be handled in a negative way if I do so.
- I may be asked to leave the study before it has finished, if the researcher feels it is in the best interest, or if I do not follow the study plan, as agreed to.

Signed at (*place*) .....on (*date*) ..../..../2017

.....
Signature of participant
Declaration by person obtaining consent

.....
Signature of witness

I *(name)* ..... declare that:

- **I clearly and in detail explained the information in this document to**

.....

- I did/did not use an interpreter.
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I gave him/her time to discuss it with others if he/she wished to do so.

Signed at (*place*) ..... on (*date*) ..../..../2017

....

Signature of person obtaining consent **Signature of witness**

Declaration by researcher

I *(name)* ..... declare that:

- I had it explained by ..... who I trained for this purpose.
- I did/did not use an interpreter
- I encouraged him/her to ask questions and took adequate time to answer all questions.
- The informed consent was obtained by an independent person.
- I am satisfied that he/she adequately understands all aspects of the research, as described above.
- I am satisfied that he/she had time to discuss it with others if he/she **wished to do so.**

Signed at (*place*) ....on (*date*) ..../..../2017

....

Signature of researcher **Signature of witness**

ANNEXURE C: Socio-demographic and health questionnaire

Socio-demographic and health questionnaire

(All information in this questionnaire is confidential).

Interviewer:

1. CW	2. BO	3. NM	4. NS	5. SK	6. Other

Date of interview

Y	Y	M	M	D	D

Participant number

Clinic Number 1-8	Participant Date of Birth						Participant# 1-30	
	Y	Y	M	M	D	D		

<u>Section 1: Socio-demographic questions</u>

1. Date of birth of the study participant (the mother)

Y	Y	Y	Y	M	M	D	D

2. What is your ethnicity (cultural group) and what language is spoken in your home?

Circle the appropriate response as given by the mother				
Ethnicity			Language spoken at home	
1	Tswana		**1**	Setswana
2	Zulu		**2**	IsiZulu
3	Xhosa		**3**	IsiXhosa
4	Coloured		**4**	Afrikaans
5	Sotho		**5**	SeSotho
6	Other (specify)		**6**	English
7	No response		**7**	Other

3. How many children do you have including this baby?

1	2	3	4 or more

4. Was your baby delivered via normal birth or by C-section?

1	2
C-section	Normal delivery

5. What is your baby's date of birth

Y	Y	Y	Y	M	M	D	D

6. What was your baby's birth weight (Road to Health Booklet)

_____

7. What is your current relationship status?

1	**2**	**3**	**4**	**Other**
Married	Not married but in a relationship with the father of the child	Single and not currently in a relationship	Single but in a new relationship (Not the father of the child)	

8. What was the last standard/grade you passed?

Codes	Education	Mark (X) only one response
1	No school education	
2	Primary School **Last standard or grade:**	
3	High school **Last standard or grade:**	
4	Tertiary Education Further Educational Training	
5	University education **Last year completed**	
6	Other	

9. I will ask you a few questions about the house you are living in now.

	Code	**1**	**2**	**3**	**4**	**5**
9.1	What material is your house built from?	Brick	Zinc / shack	Prefabricated wooden housing	Container	Other (Specify)
9.2	Most of the time, where do you get drinking water from? **(Tick one)**	Own tap in or outside the house	Communal tap	Borehole, Well	Jojo tank	Other (Specify)
9.3	What type of toilet does your house have? **(Tick one)**	Flush	Pit	Bucket, Pot	VIP	Other (Specify)
9.4	What fuel do you use most of the time for cooking (You can tick **more than one**)	Electric	Gas	Paraffin	Wood/ Coal	Open fire
9.5	Besides you and the baby, how many other people sleep in the same room with you **(Tick one)**	0	1	2	3	4 or more

10. Who are you living with currently?

1	2	3	4	5
Living with the father of the baby	Living with a new partner (not the baby's father)	Living with family	Living on your own	Other

11. Who looks after your baby most of the time?

1	2	3	4	5	6
Me myself (the mother)	Family member	Day care mother	Crèche or ECD center	Domestic worker	other

12. Have you registered your baby for the Child Support Grant?

1	**2**
Yes	No

13. What is your current source of income?

Codes	**Source of income**	
1	No income (unemployed)	
2	Self-employed: small business, sales	
3	Wage earner e.g. cleaner/domestic worker	
4	Salaried monthly paid	
5	Social grant	
6	Other (specify)……	

Section 2: Health questionnaire/ medical history

Has a doctor or nurse told you (diagnosed) that you have any of the following:

2.1 High blood pressure

1	2
Yes	No

2.2 Diabetes or high sugar levels in the blood

1	2
Yes	No

2.3 Asthma

1	2
Yes	No

2.4 Epilepsy

1	2
Yes	No

3. Postnatal care

3.1 Do you smoke?

1	2
Yes	No

3.2 In the past 7 days have your drunk any alcohol?

1	2
Yes	**No**

3.3 In the past 7 days, did you face any breastfeeding difficulties?

1	2
Yes	**No**

3.3.1 If yes, what type of breastfeeding difficulty did you have?

3.4 Did you seek any help for your breastfeeding difficulties?

1	2
Yes	No

3.5 From whom did you seek help for your breastfeeding difficulty?

1	2	3	4	5
Family member	Friend or peer	Clinic	Pharmacy	other

3.6 Are you receiving messages from MomConnect?

1	2
Yes	No

Thank you for your time. This interview will be repeated when your baby is 6-weeks old.

ANNEXURE D: Infant Feeding and Food Frequency Questionnaire

Infant Feeding and Food Frequency Questionnaire

Interviewer:

1. CW	2. BO	3. NM	4. NS	5. SK	6. Other

Date of interview

Y	Y	M	M	D	D

Participant number

Clinic Number 1-8	Participant Date of Birth						Participant# 1-30	
	Y	Y	M	M	D	D		

1. Are you breastfeeding your baby?

Yes Go to question 1.1	**No** Go to question 2

1.1 **Besides breastmilk** are you giving your baby any other milk to drink?

Yes Go to question 2	**No** Go to question 3

2. What milk feeds, (other than breastmilk), are you giving your baby? **[Do not read the options]**

2.	Questions and frequency only if response is **YES**	Coding		How often (select one option only)		
		Yes 1	No 2	1 Every day	2 2-6x/week	3 Once a week
A	Infant / baby formula (tinned formula milk). Brand:					
B	Powdered milk (Klim/Nespray/Numel) Brand:					
C	Fresh / Long-life cow's milk Brand:					
D	Drinking Yoghurt Brand:					
E	Flavoured milk (Steri-stumpie / milo) Brand:					
F	Sweetened tinned milk (condensed milk) Brand:					
G	Other milk drinks (specify)					

3 In the last seven days, have you given your baby water to drink?

Yes	**No**
Go to question 4	Go to question 5

4. Was it plain water or did you add anything to the water? How often did you give your baby water to drink? **[do not read the options]**

	Questions and frequency only if	Coding		How often (select one option only)		
	response is **YES**	Yes	No	1	2	3
4.1	Did your baby get any	1	2	Every day	2-6 x/week	Once a week
A	Boiled plain water					
B	Sugar or honey water					
C	Other water mixtures (specify)					

5. In the last seven days, besides milk feeds and water, have you given your baby anything else to drink?

Yes	**No**
Go to question 6	Go to question 7

6. What drinks (other than milk feeds and water, did you give your baby, in the past seven (7 days) **[do not read the options]**

	Questions and frequency only if	Coding		How often (select one option only)		
	response is **YES to question 5**	Yes	No	1	2	3
6	Did your baby get any	1	2	Every day	2-6x/week	Once a week
A	Tea (e.g. Rooibos)					
B	Fruit juice					
C	Juice drinks or cordial (e.g. Oros)					
D	Water based clear soup/ both (No blended veg or starch)					
E	Thin porridge in a bottle (specify)					
F	Fizzy drinks (e.g. flat Coke)					
G	Any other liquids Specify:					

7. In the past seven days, have you given your baby any food to eat?

Yes	**No**
Go to question 8	Go to Question 9

8. What foods have you given your baby in the last seven (7) days? **[do not read the options]**

	Questions and frequency only	Coding		How often (select one option only)		
8	if response is **YES** Did your baby get any	Yes 1	No 2	1 Every day	2 2-6x/week	3 Once a week
A	Pureed commercial Baby foods (specify)					
B	Infant cereals e.g. Nestum					
C	Other packaged baby foods (e.g. biscuits)					
D	Porridge (any type)					
E	Bread (white or brown)					
F	Specify spread on bread					
G	Rice					
H	Mashed potatoes e.g. smash					
I	Mashed vegetables (specify)					
J	Mashed fruits					
K	Liver, heart (organ meats)					
K	Red meat (specify)					
L	Poultry (chicken, duck) specify					
M	Fish (tin and fresh) specify					
N	Eggs					
O	Sweets/Chocolates					
P	Chips (e.g. Flings)					
Q	Biscuits (e.g. Marie) specify					
R	Grubs, snails or worms specify					
S	Other foods specify					

9. In the past 7 days, have you given your baby any vitamins?

Yes	**No**
Go to question 9.1	Go to question 10

9.1 What vitamins are you giving your baby? **[do not read the options]**

	Questions and frequency only if	Coding		How often (select one option only)		
9.1	response is **YES** Did your baby get any	Yes 1	No 2	1 Every day	2 2-6x/week	3 Once a week

A	Scotts emulsion (specify)					
B	Other (specify)					

10. In the past 7 days, have you given your baby any medicines?

Yes	**No**
Go to question 10.1	Go to question 11

10.1 What did you give your baby? **[do not read the options]**

	Questions and frequency only if	Coding		How often (select one option only)		
	response is **YES**	Yes	No	1	2	3
10.1	Did your baby get any	1	2	Every day	2-6x/week	Once a week
A	Dutch medicines (specify)					
B	Colic medicines (Gripe water)					
C	Traditional medicines					
d	Other (specify)					

11. In the past 7 days, have you given your baby any ORS (oral rehydration solution) or ORT (Oral Rehydration Therapy)

Yes	**No**
Go to question 11.1	End of questionnaire

11.1 What did you give your baby? **[Do not read the options]**

		Coding		How often (select one option only)		
	Questions and frequency	Yes	No	1	2	3
11.1	only if response is **YES**	1	2	Every day	2-6x/week	Once a week
A	ORS mixture					
B	Raw custard (maizena water)					
C	Flat Coke					
D	Other					

Thank you for your time. This interview will be repeated when your baby is 6-weeks old.

ANNEXURE E: North West provincial department of Health research approval letter

health
Department of
Health
North West Province
REPUBLIC OF SOUTH AFRICA

3801 First Street
New Office Park
MAHIKENG, 2735

Enq: Nthabiseng Mapogo
Tel: 018 391 4504
NMapogo@nwpg.gov.za
www.nwhealth.gov.za

POLICY, PLANNING, RESEARCH, MONITORING AND EVALUATION

Name of researcher : Mrs. Chantell Witten and Prof HS Kruger
North West University

Physical Address (Work/ Institution) : Centre of Excellence for Nutrition, North-West University, Potchefstroom

Subject : **Research Approval Letter- Mothers' breastfeeding experiences and practices: An explorative mixed methods study in the sub-district of Tlokwe, North West Province, South Africa.**

This letter serves to inform the Researcher that permission to undertake the above mentioned study has been granted by the North West Department of Health. The Researcher is expected to arrange in advance with the chosen facilities, and issue this letter as proof that permission has been granted by the Provincial office.

This letter of permission should be signed and a copy returned to the department. By signing, the Researcher agrees, binds him/herself and undertakes to furnish the Department with an electronic copy of the final research report. Alternatively, the Researcher can also provide the Department with electronic summary highlighting recommendations that will assist the department in its planning to improve some of its services where possible. Through this the Researcher will not only contribute to the academic body of knowledge but also contributes towards the bettering of health care services and thus the overall health of citizens in the North West Province.

Kindest regards

Dr. FRM Reichel
Director: PPRM&E

30/10/2017
Date

LEPAPHA LA BOITEKANELO
DEPARTMENT OF HEALTH
Kgaetsedi Road /Private Bag X2068
MMABATHO, 2735
30 OCT 2017
NORTH WEST PROVINCE
REPUBLIC OF SOUTH AFRICA

Researcher

30/10/2017
Date

Healthy Living for All

ANNEXURE F: Ethical approval from the North West University Human Research Ethics Committee for the cohort prospective study

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT

Private Bag X6001, Potchefstroom,
South Africa, 2520

Tel: (018) 299-4900
Faks: (018) 299-4910
Web: http://www.nwu.ac.za

Research Ethics Regulatory Committee
Tel: +27 18 299 4849

Email : Ethics@nwu.ac.za

ETHICS APPROVAL CERTIFICATE OF STUDY

Based on approval by **Health Research Ethics Committee (HREC)** on **21/09/2017**, the North-West University Research Ethics Regulatory Committee (NWU-RERC) hereby **approves** your study as indicated below. This implies that the NWU-RERC grants its permission that provided the special conditions specified below are met and pending any other authorisation that may be necessary, the study may be initiated, using the ethics number below.

Study title: Mothers' breastfeeding experiences and practices: An explorative mixed methods study in the sub-district of Tlokwe, North West Province, South Africa.

Study Leader/Supervisor: **Prof HS Kruger**
Student: **C Witten - 26764946**

Ethics number:

N	W	U	-	0	0	0	3	0	-	1	7	-	A	1
Institution				Study Number						Year			Status	

Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

Application Type: Larger study
Commencement date: 21/09/2017 **Risk:** **Medium (monitoring report required six-monthly)**

Approval of the study is initially provided for a year, after which continuation of the study is dependent on receipt of the annual (or as otherwise stipulated) monitoring report and the concomitant issuing of a letter of continuation.

General conditions:

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, please note the following:

- *The study leader (principle investigator) must report in the prescribed format to the NWU-RERC via HREC:*
  - *annually (or as otherwise requested) on the monitoring of the study, and upon completion of the study*
  - *without any delay in case of any adverse event or incident (or any matter that interrupts sound ethical principles) during the course of the study.*
- *Annually a number of studies may be randomly selected for an external audit.*
- *The approval applies strictly to the proposal as stipulated in the application form. Should any changes to the proposal be deemed necessary during the course of the study, the study leader must apply for approval of these amendments at the HREC, prior to implementation. Should there be any deviations from the study proposal without the necessary approval of such amendments, the ethics approval is immediately and automatically forfeited.*
- *The date of approval indicates the first date that the study may be started.*
- *In the interest of ethical responsibility the NWU-RERC and HREC retains the right to:*
  - *request access to any information or data at any time during the course or after completion of the study;*
  - *to ask further questions, seek additional information, require further modification or monitor the conduct of your research or the informed consent process.*
  - *withdraw or postpone approval if:*
    - *any unethical principles or practices of the study are revealed or suspected,*
    - *it becomes apparent that any relevant information was withheld from the HREC or that information has been false or misrepresented,*
    - *the required amendments, annual (or otherwise stipulated) report and reporting of adverse events or incidents was not done in a timely manner and accurately,*
    - *new institutional rules, national legislation or international conventions deem it necessary.*
- *HREC can be contacted for further information or any report templates via Ethics-HRECApply@nwu.ac.za or 018 299 1206.*

The RERC would like to remain at your service as scientist and researcher, and wishes you well with your study. Please do not hesitate to contact the RERC or HREC for any further enquiries or requests for assistance.

Yours sincerely

Prof LA Du Plessis

Digitally signed by Prof LA Du Plessis
Date: 2017.10.12 08:58:07 +02'00'

Prof Linda du Plessis
Chair: NWU Research Ethics Regulatory Committee (RERC)

ANNEXURE G: Ethical approval for this study from the North West University Human Research Ethics Committee

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Web: http://www.nwu.ac.za

Health Sciences Ethics Office for Research, Training and Support

North-West University Health Research Ethics Committee (NWU-HREC)
Tel: 018-285 2291
Email: Wayne.Towers@nwu.ac.za

Prof M Faber
Nutrition
CEN

25 April 2019

Dear Prof Faber

APPROVAL OF YOUR APPLICATION BY THE NORTH-WEST UNIVERSITY HEALTH RESEARCH ETHICS COMMITTEE (NWU-HREC) OF THE FACULTY OF HEALTH SCIENCES

Ethics number: NWU-00030-17-A1-01

Kindly use the ethics reference number provided above in all future correspondence or documents submitted to the administrative assistant of the North-West University Health Research Ethics Committee (NWU-HREC) secretariat.

Study title: Factors associated with exclusive breastfeeding amongst a cohort of mothers with infants aged 0-8 weeks in Tlokwe Sub-district, North West province

Study leader: Prof M Faber

Student: BB Olifant-23687665

Application type: Sub-study

Risk level: Minimal (monitoring report required annually)

Expiry date: 30 April 2020 (monitoring report is due at the end of April annually until completion)

You are kindly informed that after review by the NWU-HREC, Faculty of Health Sciences, North-West University, your ethics approval application has been successful and was determined to fulfil all requirements for approval. Your study is approved for a year and may commence from 25/04/2019. Continuation of the study is dependent on receipt of the annual (or as otherwise stipulated) monitoring report and the concomitant issuing of a letter of continuation. A monitoring report should be submitted two months prior to the reporting dates as indicated i.e. annually for minimal risk studies, six-monthly for medium risk studies and three-monthly for high risk studies, to ensure timely renewal of the study. A final report must be provided at completion of the study or the NWU-HREC, Faculty of Health Sciences must be notified if the study is temporarily suspended or terminated. The monitoring report template is obtainable from the Faculty of Health Sciences Ethics Office for Research, Training and Support at Ethics-HRECMonitoring@nwu.ac.za. Annually, a number of studies may be randomly selected for an internal audit.

The NWU-HREC, Faculty of Health Sciences requires immediate reporting of any aspects that warrants a change of ethical approval. Any amendments, extensions or other modifications to the proposal or other associated documentation must be submitted to the NWU-HREC, Faculty of Health Sciences prior to implementing these changes. These requests should be submitted to Ethics-HRECApply@nwu.ac.za with a cover letter with a specific subject title indicating, "Amendment request: NWU-XXXXX-XX-XX". The letter should include the title of the approved study, the names of the researchers involved, the nature of the amendment/s being made (indicating what changes have been made as well as where they have been made), which documents have been attached and any further explanation to clarify the amendment request being submitted. The amendments made should be indicated in yellow highlight in the amended documents. The *e-mail*, to which you attach the documents that you send, should have a *specific subject line* indicating that it is

an amendment request e.g. "Amendment request: NWU-XXXXX-XX-XX". This e-mail should indicate the nature of the amendment. This submission will be handled via the expedited process.

Any adverse/unexpected/unforeseen events or incidents must be reported on either an adverse event report form or incident report form to Ethics-HRECIncident-SAE@nwu.ac.za. The *e-mail*, to which you attach the documents that you send, should have a specific subject line indicating that it is a notification of a serious adverse event or incident in a specific project e.g. "SAE/Incident notification: NWU-XXXXX-XX-XX". Please note that the NWU-HREC, Faculty of Health Sciences has the prerogative and authority to ask further questions, seek additional information, require further modification or monitor the conduct of your research or the informed consent process.

The NWU-HREC, Faculty of Health Sciences complies with the South African National Health Act 61 (2003), the Regulations on Research with Human Participants (2014), the Ethics in Health Research: Principles, Structures and Processes (2015), the Belmont Report and the Declaration of Helsinki (2013).

We wish you the best as you conduct your research. If you have any questions or need further assistance, please contact the Faculty of Health Sciences Ethics Office for Research, Training and Support at Ethics-HRECApply@nwu.ac.za.

Yours sincerely

Digitally signed by Wayne Towers
Date: 2019.04.25 14:12:30 +02'00'

Prof Wayne Towers
Chairperson: NWU-HREC

Digitally signed by Prof Minrie Greeff
Date: 2019.04.25 14:44:14 +02'00'

Prof Minrie Greeff
Head of Health Sciences Ethics Office for Research, Training and Support

Current details: (23239522) G:\My Drive\9. Research and Postgraduate Education\9.1.5.3 Letters Templates\9.1.5.4.1_Approval_letter_HREC.docm
30 April 2018

File reference: 9.1.5.4.1